APRIL, 1944

0,000 COPIES

TOOL & DIE JOURNAL

TOOLING AND PRODUCTION

IMMEDIATE DELIVERY

From This Stock On All 761 Items In The Putnam Line

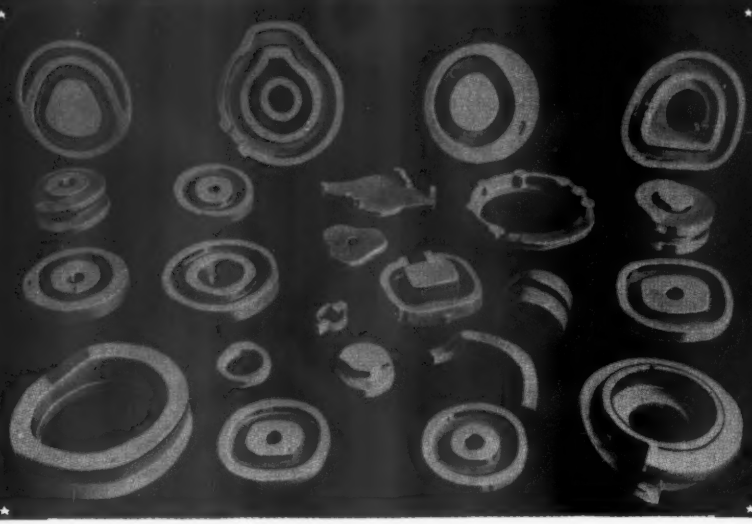
This photograph shows one part of the Putnam Tool Company stock room in which are maintained complete stocks of Putnam Hi-Speed End Mills, Continuous Pilot Counterbores and Spiral Fluted Chucking Reamers. Putnam dealers also carry complete stocks of Putnam tools available for immediate delivery. In any part of the country, delivery can be made within 48 hours after the order is received.

If you are not familiar with the complete line of Putnam tools, write for a catalog today . . . or call the nearest Putnam representative.

NAVY

PUTNAM TOOL COMPANY

2985 CHARLEVOIX AVE. • DETROIT 7, MICH.



Make YOUR *Cams this* MODERN MONEY-SAVING *Way*

IT WILL pay you to look into this method if you build or operate machines that use cams. Cast to shape from FCC Air Hardening Steel, your cams reach you with only an eighth-inch to be machined off, even from very intricate shapes. Of course this means big savings of time and material.

FCC Air Hardening Steel has great resistance to abrasion and an extremely high compressive strength. It machines readily and is easy to harden in air with unusual freedom from distortion and cracking. Cams made from it give remarkably long wear.

Full information is available in Booklet TD. Write for your copy or send your specifications for estimates today.

Prompt delivery under CMP.

INVESTIGATE FCC CAST TO SHAPE AIR HARDENING STEEL CAMS FOR THESE MACHINES:

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Allegheny Ludlum
STEEL CORPORATION

Forging and Casting Division
FERNDALE 20, MICHIGAN

W & D 9362A

April,

HARDINGE-SJOGREN Speed Collet Chucks

Enable you to get MORE PRODUCTION from YOUR LATHES and MILLING MACHINES

A Hardinge-Sjogren Nose Type Speed Collet Chuck enables you to get full value from your investment in tool room lathes, engine lathes and milling machines. It gives greater capacity, saves time, increases accuracy and assures better results.

The amazingly fast action of the Hardinge-Sjogren Speed Collet Chuck gives it full right to its name. An almost effortless turn of the handwheel, one way or the other, automatically opens or closes the collet, releasing or gripping the work as desired. Its grip is adjustable and sure. Production is increased as the operator is always in front of his work.

Available in three sizes for 1", 1-3/8", or 1-3/4" collet capacity.

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ELMIRA, N.Y.

"PERFORMANCE HAS ESTABLISHED LEADERSHIP FOR HARDINGE"

RUBBER CUSHIONED COUNTERSHAFT* and 3-POINT SUSPENSION

TWO RUBBER CUSHIONED BEARINGS, one at each of the two hinge points connecting countershaft and headstock, absorb motor vibration.
TWO RUBBER BUTTONS cushion cone pulley guard.
ONE RUBBER CUSHION between motor mounting base and pedestal further eliminates transmission of motor vibration.

Swing over bed, 18½"... bed length, 43½"...spindle hole, 25/32"...capacity, ⅝" with push type collet...8-position automatic indexing turret...stroke of turret, 4½"...12 spindle speeds from 30 to 1450 r.p.m.... moving parts protected by ball bearings or self-lubricating bronze bearings.

No. 840
Quick Change Gear Turret Lathe with automatic apron

motor vibration absorbed

In Logan Lathes the smooth operation essential to finely finished precision work is doubly assured... first, by rubber cushioning at vital points...second, by carrying the countershaft on a three-point suspension. To absorb the motor's vibration, to prevent its transfer to the lathe proper, the patented Logan countershaft is rubber cushioned at all three of its main supporting points... the pedestal red and the two hinge pins. In addition, the cone pulley guard, which covers both countershaft and headstock, rests on rubber buttons. *The entire Logan countershaft assembly is so designed that at no point is there a direct metal-to-metal contact between countershaft and headstock.* Furthermore, the three-point suspension steadies the whole countershaft assembly so that it cannot rock. This combination of rubber cushioning and three-point suspension is another example of the advanced design that assures sustained accuracy, safe operation, long life, and high-speed, low-cost production in all models of Logan Lathes. Write today for your copy of the latest Logan Catalog.

LOGAN ENGINEERING CO.
CHICAGO 30, ILLINOIS

Logan

A NAME TO REMEMBER WHEN YOU THINK OF LATHES

One of a series describing the finer features of Logan Lathes

ONE FILE . . . BUT 2-FILE FILING!

YOU CAN THINK of a NUCUT as two files in one. That is because it gives you an exclusive combination of coarse file teeth and fine file teeth, scientifically positioned in patented "Wavy Rows". The coarse teeth cut deep, clean and true. The fine teeth level the surface smooth at the same stroke. Just as if two files were working instead of one. The result is more metal removed faster, with less effort. And without skidding or scraping!

NUCUTS are obtainable for filing practically everything from stainless steel, iron, aluminum, brass and copper, to slate, wood, fibre and plastics. See your distributor for the lengths, shapes and cuts you need.

HELLER BROTHERS COMPANY

America's Oldest File Manufacturers — Good Tools Since 1836

Newark, N. J. Newcomerstown, Ohio

NUCUT "WAVY TEETH"

This magnification shows the patented (No. 2027039) "Wavy Teeth" design that makes a NUCUT a twofold-filing file. This exclusive feature assures faster, easier, smoother filing and helps you meet today's stepped-up wartime production demands.

HELLER NUCUT WAVY TEETH FILES

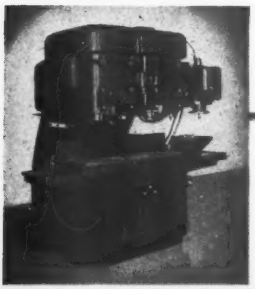
PAT. NO. 2027039

Here's Assistance

Behind every recognition for a job well done, the "E" awards and renewal stars for production, lies a tremendous amount of planning and thought. Without it, nothing would have been accomplished. Now, while production for war continues, a good part of the brain-power which planned the conversion can be applied to planning for the future. Every angle must be investigated, with full consideration to more efficient application of machinery.

Machine tools bearing the CINCINNATI trade mark, so prominent in tooling for victory, will again be applied to the production of automobiles, farm machinery, radio equipment and other consumer goods. Our engineers have long experience in offering the right machine, fixture, and cutters to meet specific requirements. Whether you are retooling for new war production or planning for the future, they will be glad to work with you on machining operations involving milling, grinding, broaching, lapping, die sinking and cutter sharpening.

CINCINNATI



TOOL ROOM AND MANUFACTURING MILLING MACHINES . . SURFACE BROACHING MACHINES . . CUTTER SHARPENING

FOR THAT NEVER-ENDING JOB

of Planning for the Future

A copy of our new General Catalog, No. M-995-2, is yours for the asking. Perhaps it will give you some ideas on machines for your future production lines.

Left: Here are two of the newer CINCINNATI Machines which are doing grand jobs of war production, and will take a prominent place in peace-time production. Literature on request. *Left:* CINCINNATI 4-Spindle 360 Degree Automatic Profiler (catalog M-1215). *Right:* CINCINNATI 6" Plain Hydraulic Grinding Machine, Model ER (catalog G-592).

MACHINES . . . CENTERTYPE GRINDING MACHINES . . . CENTERLESS GRINDING MACHINES . . . CENTERLESS LAPPING MACHINES

FIRTHITE
ARMY-NAVY

NOW CALL YOUR REGULAR TOOL MAKER

ANNOUNCING A NEW CONVENIENCE TO FIRTHITE USERS

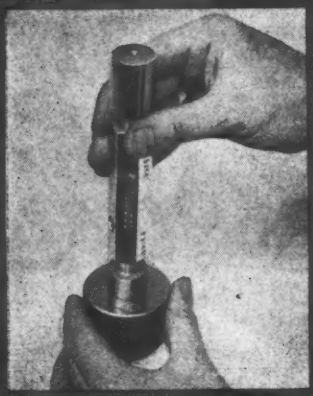
Through new arrangements with hundreds of "authorized" Tool Makers located in every industrial center in the United States, they are now prepared to supply Firthite-tipped tools for quick delivery. We suggest that you contact your **REGULAR TOOL MAKERS** for Firthite Sintered Carbide. In case you do not immediately find the Firthite tool maker or distributor nearest you, any Firth-Sterling Office will gladly give you the name of "authorized" Tool Makers who will now supplement our own facilities.

Firth-Sterling
STEEL COMPANY

Offices: McKEESPORT, PA. NEW YORK · HARTFORD · PHILADELPHIA · CLEVELAND · DAYTON · DETROIT · CHICAGO · LOS ANGELES

Makers of High-Speed Steels, Tool and Die Steels, and Sintered Carbides

How PILOT GAGES Speed Up Work



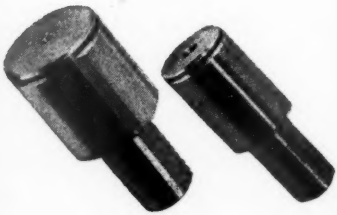
Time saved in gage applications means time and money saved in production.

Now take another look at the pictures. See how the PM Pilot plug gage is inserted from the side, at an angle. Then straighten it up to the perpendicular and it slides smoothly into the hole, even when there is only a slight difference in size between gage and hole.

There's no forcing of the gage, no jamming, no spoiled work, no damaged gages. Work goes smoother—gages last longer and hold their accuracy.

You can prove this in your own shop. Try just one pilot gage, if you are not already using them. That little groove around the nose makes all the difference in the world—in both the quality of your work and the economy of getting it done with speed.

On your next order for plug gages, specify the Pilot type—it will pay you.



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The PIPE MACHINERY COMPANY Cleveland, O.

GAGES • HOBS • MILLING CUTTERS • SPECIAL TOOLS

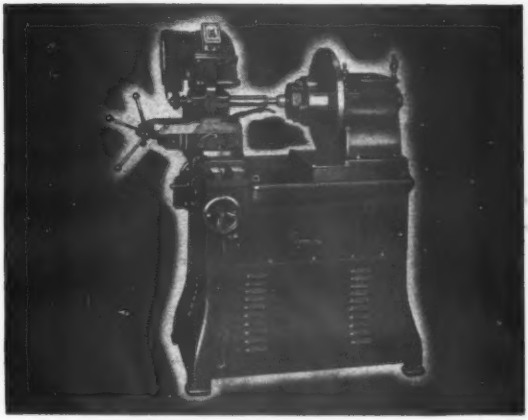
The Star on Lempco's "E" Flag is for Continued Outstanding Production

ONLY THE ***BEST*** IS GOOD ENOUGH
WHEN WE ***USE 'EM*** ON OUR OWN
PRODUCTION LINE

LEMPCO

DESIGNERS • BUILDERS • USERS
OF
PRODUCTION-PROVED MACHINE TOOLS

A NEW INTERNAL AND SURFACE GRINDER



MODEL ACX

CEILING-PRICED!

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For internal, external, surface and taper jobs. Both rack and pinion and screw feed on longitudinal travel. Automatic power cross-feed with micrometer screw adjustment. Mechanical stops prevent spoilage. Chucks quickly and easily mounted on face plate by a single draw bar through hollow work spindle. Quick-change work speeds; 6,000 and 12,000 R. P. M. spindle speeds; 2 H.P. grinding head motor; ½ H.P. work-head motor—all self-contained. Exclusive Lempco AUTO-SIZER enables even inexperienced operators to exactly duplicate successive pieces on long runs.

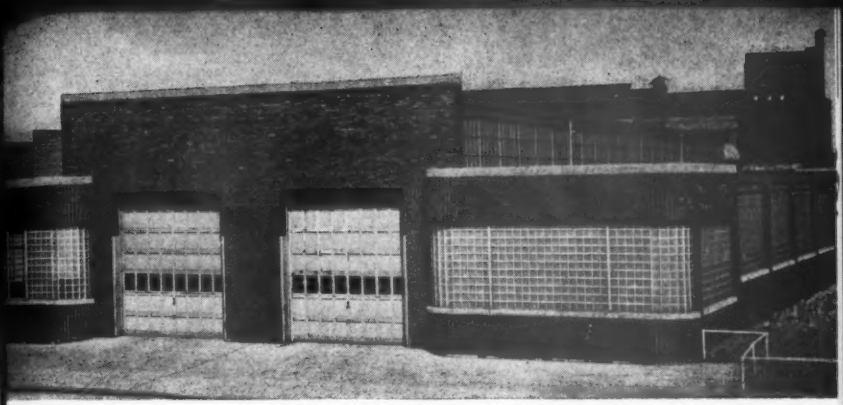
HAS WHAT IT TAKES TO DO YOUR JOB RIGHT . . . at the right price

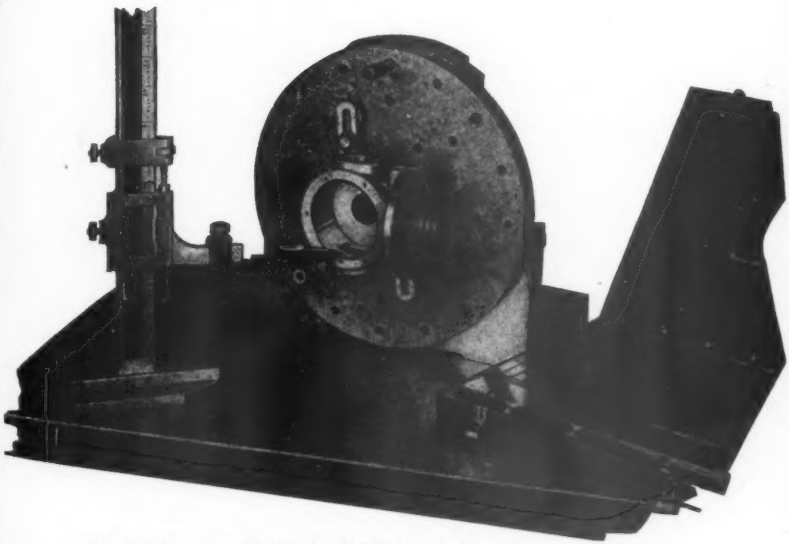
Buyers of precision tooling weigh every factor when they place orders. Our customers—new as well as old—know that every factor in our work is right—design, materials, layout, machine work, testing, inspection and cooperation on delivery. They come back when all these factors—and the price—are right.

For 23 years our contract shop work has included the design and building of fixtures. The Becker Index Master is equally useful for layout, indexing and inspection. It makes the hand scriber, sine bar and costly special inspection fixtures obsolete and unnecessary. Rugged and compact, the Becker Index Master will retain its accuracy for years with normal use.

THE BUNELL MACHINE & TOOL COMPANY

1601 EAST 23RD STREET • TELEPHONE CHERRY 0343 • CLEVELAND 14, OHIO





The Becker Index Master is shown in use for checking drawing specifications of a casting. A height gauge and indicator verifies dimensions quickly and easily in one setup. Irregular shapes in a range of sizes can be checked by utilizing blocks and clamping the Becker Index Master.

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Tools • Special Machinery • Dies • Jigs • Gauges • Fixtures

PRECISION PRODUCTION OF PARTS AND ASSEMBLIES

STANDARD CUTTERS

ready for immediate delivery!

also

SPECIAL CUTTING TOOLS
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Welch INDUSTRIES, INCORPORATED

20000 W. 8 MILE ROAD DETROIT, MICHIGAN

High Speed MILLING CUTTERS • FORM TOOLS • SPECIAL TOOLS

STEP-UP YOUR PRODUCTION CARBURIZING with Park No. 8 N.B. CARBURIZER

PROVE
it to Yourself!

Prove to yourself that Park's No. 8 carburizer is superior to charcoal-coke compounds for small parts. Send in your order today for a trial run.

IMMEDIATE DELIVERY!

All orders for Park No. 8 carburizers can be shipped the same day they're received.

Manufacturers and commercial heat treating companies have been unanimous in their claims that Park No. 8 non-burning carburizer is far superior to other carburizing compounds for the production carburizing of small parts.

They base their claims upon the satisfactory results obtained in using Park No. 8 N.B. carburizer. They have found the fine texture of Park No. 8 to be ideal for thoroughly covering the smallest parts, thereby insuring uniform case depths at all times. A saving in labor was also effected by the elimination of:

1st: Hand packing operations;

2nd: Frequent changing of the carburizer (because No. 8 is non-burning it can be used over and over).

These advantages plus the added features listed at right prove that you can realize definite savings in carburizing small parts when you use Park's No. 8 N.B. carburizer.

For complete information and prices about Park No. 8 carburizer wire or write us today.

★ **Features** ★

1 NO REMIXING NECESSARY. Park No. 8 can be used over and over.

2 NO BURNING LOSS. Park No. 8 does not burn after dumping.

3 NO CHANCE TO EXPOSE PARTS THROUGH SHRINKAGE. Due to low initial shrinkage of Park No. 8 exposure of parts is not evident.

4 NO INDIVIDUAL HAND PACKING with Park No. 8. Parts can be shoveled into box.

5 TIME SAVED IN EMPTYING BOXES. Can be emptied by placing fine screen over drum and dumping.

6 UNIFORMITY OF RESULTS. Coke build-up eliminated, all parts covered by free flowing Park No. 8.

7 FASTER COOLING OF POTS. Hours saved by non-burning Park No. 8.

8 TIME SAVED IN CLEANING COMPOUND. Seldom necessary to clean Park No. 8.

Park

● Liquid and Solid Carburizers ☆ Cyanide, Neutral and High Speed Steel Salts ☆ Lead Pot Carbon ☆ Charcoal ☆ Coke ☆ No Carb. ☆ Carbon Preventer ☆ Quenching and Tempering Oils ☆ Drawing Salts ☆ Metal Cleaners ☆ Liquid Grain Cement

8072 MILITARY AVE. DETROIT, MICH.

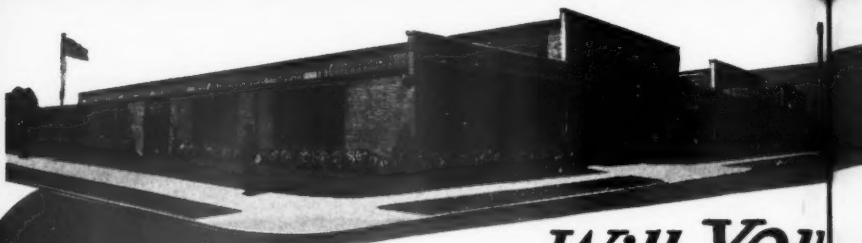
DO YOU NEED GAGE BLOCKS IN A HURRY?

These Ellstrom made Chromium Plated Gage Blocks are now being delivered reasonably fast to those manufacturers who are doing vital war work.

The photograph above shows Set No. 81 containing 81 blocks ranging from .050 to 4 inches in size. There are other Dearborn Gage sets available, a complete description including prices of these will be sent to you upon request. Wire or write us today or contact your nearest Dearborn representative.

DEARBORN GAGE CO. 22038 BEECH STREET DEARBORN, MICH.

Originators of Chromium Plated Gage Blocks



Will You
WHEN COMPETITORS

TOOLS • JIGS • FIXTURES • GAUGES • EXPERIMENTAL PARTS *LARGE OR SMALL* • MADE TO THE HIGHEST STANDARD KNOWN TO THE INDUSTRY.

Contract Fabrication of Parts

Unexcelled Inspection Facilities

STILL BE TOOLING? ARE *SELLING*—!

The next great hurdle confronting American industry is reconversion and retooling for post war business.

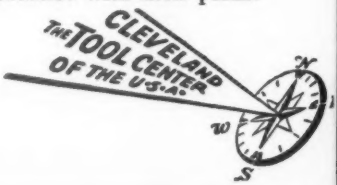
Retooling of the automotive industry alone is estimated at $300,000,000. Add to this the equipment that will be required for production of thousands upon thousands of new products already designed—tested—approved—and yet to be developed.

The vast program involved and time limits imposed will tax even the greatly expanded capacity of the country's tool plants. Production "bottlenecks" are inevitable for some manufacturers.

Correct "timing" will be required as to development and testing of new products—building of "pilot" models—tooling for mass production—and announcement of those products to waiting but doubtless highly competitive markets.

We're still under the high pressure of war production but are already discussing post war work with "far seeing manufacturers"—developing experimental parts and scheduling completion of their tooling equipment in accordance with their plans.

We'll be glad to discuss present or future plans at your office or here at our plant. Call upon us or write for literature describing our facilities.



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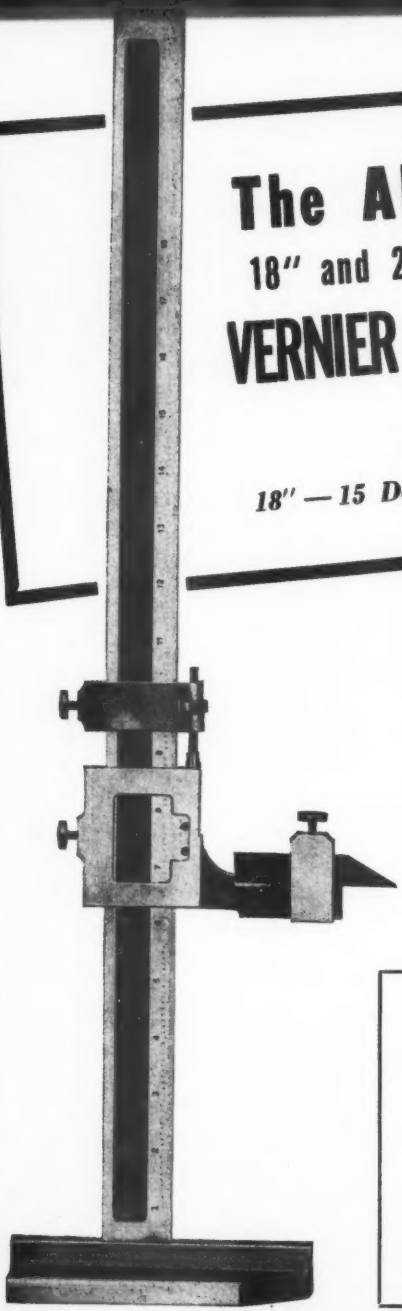

18" Vernier Height Gauge, Scriber and Case, F. O. B. Detroit,

$103.00

24" Vernier Height Gauge, Scriber and Case, F. O. B. Detroit,

$190.00

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CHICAGO
MOUNTED WHEELS and Small GRINDING WHEELS

A complete range of styles, grains and sizes up to 3" in diameter to give you a perfect finish on every job.

PROMPT DELIVERY

Specialization—with full WPB approval—on sizes 3" in diameter and under, means no waiting for Chicago Grinding or Mounted Wheels. Let us take care of your present and post-war requirements.

FREE ENGINEERING ANALYSIS

If you have a grinding job that presents a problem because of the nature of material, tricky shape or other reason, tell us about it. Our experts will go into a huddle and give you the benefit of our long experience making millions of custom built wheels for every conceivable operation.

YES, YOU CAN FINISH IT BETTER WITH A CHICAGO WHEEL

MOUNTED WHEELS — SMALL GRINDING WHEELS

Half a Century of Specialization has Established our Reputation as the Small Wheel People of the Industry.

Just as the prelude to a new world is better tools of war, so the prelude to a perfect finish is better grinding wheels. Today's standards of finishes are far and beyond those of yesterday. To acquire them without sacrifice of production time is a goal which everyone seeks.

Finish must now be measured in micro inches. That's where the new Chicago FV BOND Wheels excel. They give a precision smoothness so intensified that it passes any surface analyzer test, in many cases eliminating hand lapping and auxiliary finishing operations.

HERE'S WHAT MAKES CHICAGO WHEELS CLICK:

A—Sensational new FV BOND. Result of research and experiment on hundreds of aircraft jobs.
B—No sacrifice of cutting time or wheel life.

FV BOND is available in all types of Chicago Mounted and Small Grinding Wheels—in all abrasives, grain and grade combinations.

TEST WHEEL FREE — To prove their superiority in your own shop, send for a Chicago Wheel made with FV BOND. Give us details of the job, material you want to finish and we'll do the rest.

Write for Catalog and interesting Engineering Survey Form

CHICAGO WHEEL & MFG. CO.
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TD-4

Send Catalog and Survey Form. Interested in ☐ Grinding Wheels ☐ Mounted Wheels ☐ Send Test Wheel Size_____.

NAME_____

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REGRINDING by new tool craftsmen!

For Best Service—
Send Your Worn Cutters to the Nearest Severance Plant

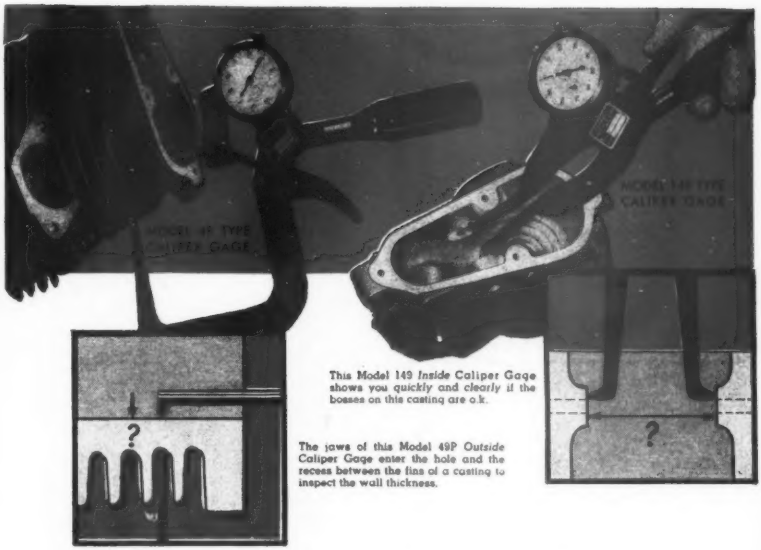
In the six modern, completely equipped Severance plants in the United States, the renewing of worn, dulled rotary cutters has become as much of the daily business as the manufacture of new tools.

Actually, the regrinding of your worn tools requires the same experience and the same precise skill as used by Severance craftsmen in the manufacture of new Severance tools. Each flute is given the correct pitch and depth so the finished tool will not chatter. Each edge is carefully ground so the renewed tool will take the same deep, sharp bites as a new tool. And after being accurately reground, your tools are further improved by the exclusive "Severite" heat treat process that gives additional hardness to the teeth and increases their cutting life — between regrinds — from three to five times.

Check up on the worn and dulled tools in your plant now. For best service, send them to the Severance plant nearest you for a factory regrinding job.

Severance

MIDGET MILLING CUTTERS • PRECISION REGRINDING • Severance Tool Industries Inc., Saginaw, Mich. • Plants in Long Island City, 1, N. Y.; Detroit, 2, Mich.; Fort Wayne, Ind.; Chicago, 6; and Los Angeles, 21. In Canada: 60 Front Street West, Toronto, Ontario.



This Model 149 *Inside* Caliper Gage shows you *quickly* and *clearly* if the bosses on this casting are o.k.

The jaws of this Model 49P *Outside* Caliper Gage enter the hole and the recess between the fins of a casting to inspect the wall thickness.

The Easiest Way to Inspect OUTSIDE *and* INSIDE *DIMENSIONS* - - - - -

Dimensions do not have to be limited to fine tolerances in order to get a lot of use from these gages. Their greatest value is their convenience — their quick, easy and direct way of getting into odd positions and telling you whether a dimension is right or wrong, and *how much* wrong. The jaws can be made in every conceivable shape to get practically into any position.

The Model 49 *Outside* Calipers and the Model 149 *Inside* Calipers are equipped with Dial Indicators graduated in .01" or 1/64". They can be furnished for comparing dimensions or for direct measurements. Though not high precision instruments, they are exceptionally popular calipers. Their use has saved many times their cost, time and again. It will pay you to use them rather than take a chance on many a job. Use them on patterns, cores, castings, forgings, tubing, shells, bottles, plastics, formed shapes; in fact, any irregular shaped workpiece. Ask us about a gage with jaws designed to fit your work.

FEDERAL PRODUCTS CORPORATION
1144 EDDY STREET, PROVIDENCE 1, R. I.

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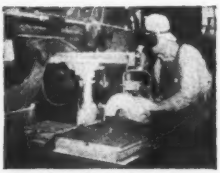
WHEN THE ALL CLEAR SOUNDS
YOU'LL
Save Months
IN RECONVERSION
WITH
Walker-Turner
MACHINE TOOLS

(Radial Drill)
Typical example of Walker-Turner versatility is this Radial Drill. Drills to the center of a 62" circle. Spindle speed range, 160 to 8200 R.P.M. Head tilts 45° in either direction.

These streamlined units deserve a place in your reconversion — because they're flexible, rugged, simple, safe, easy to operate, and offer a wide range of speeds for cutting practically any material. On the "costs" side, Walker-Turner Machine Tools show marked savings in power consumption, capital investment and operating expenditures. And fast delivery . . . to help you avoid reconversion delays . . . will be another Walker-Turner feature.

WALKER-TURNER COMPANY, Inc., Plainfield, N. J.

(20" Drill Press)
Automatic power feed is a feature of the newest Walker-Turner 20" Drill Press.



(Metal Cut-off Machine)
"Kick" cutting with a Walker-Turner Radial Cut-off machine.

(Band Saw)
Cutting a special profile in plastics with a Walker-Turner Band Saw.

105

walker-Turner COMPANY, INC. PLAINFIELD, N.J. U.S.A.

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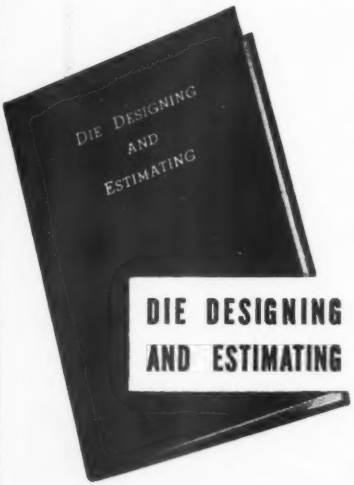

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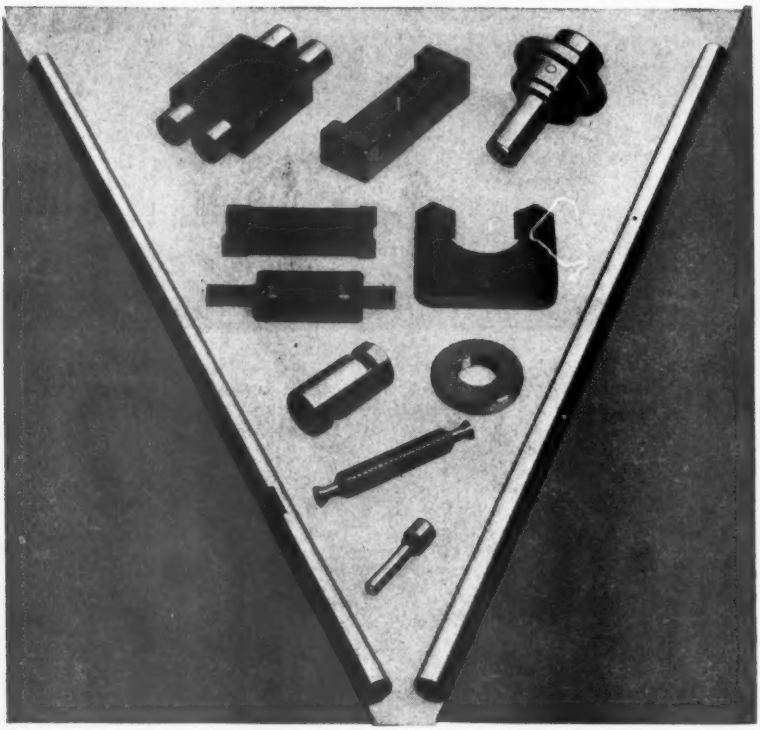

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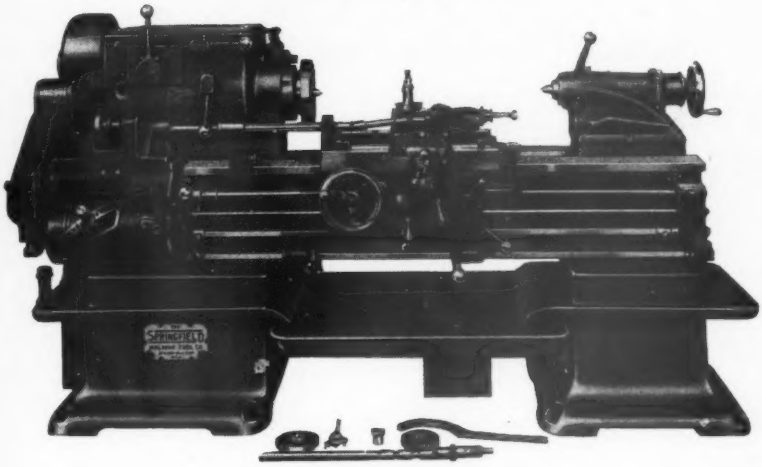

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Tells the why and how of Springfield's accurate production.

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AVAILABLE IN TWO SIZES

Type	*Chamber Capacity*	*Amps 115 V*	*Watts*	*Amps 230 V*	*Price*
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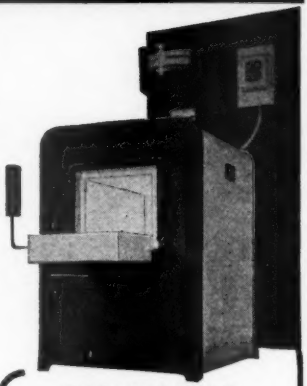

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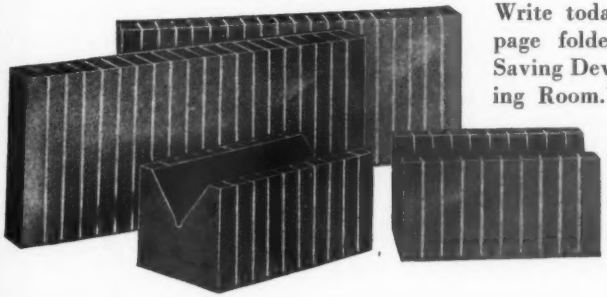

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BRIGHTON, BOSTON, MASS., U.S.A.

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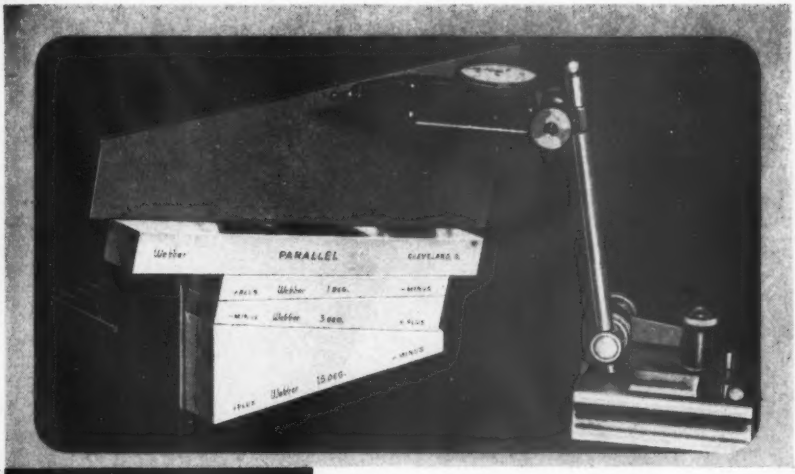

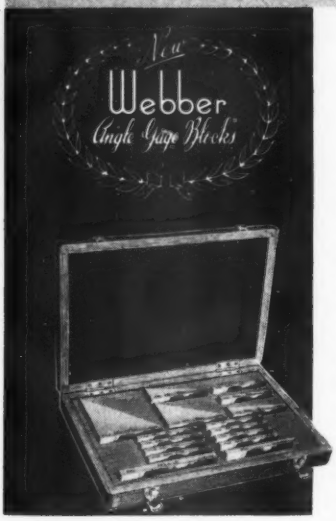

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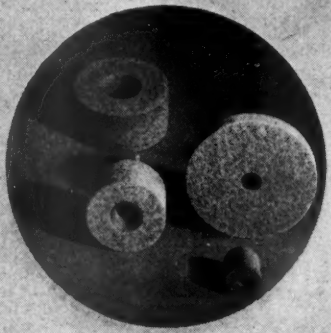

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RADIAC MOUNTED POINTS AND MOUNTED WHEELS. All wheels and points are dressed and finished ready to use. · All are 100% tested to precision tolerances. · Concentricity is guaranteed. · Special Bakelite cement secures wheel to mandrel. · Available in tough, regular aluminum oxide (brown) or in special aluminum oxide (white or red bond) for greater friability.

RADIAC INTERNAL GRINDING WHEELS. All wheels are 100% tested to precision tolerances. Radiac Internal Grinding Wheels are available in tough, regular aluminum oxide (brown), in special aluminum oxide (white or red bond) or a special exclusive "Blue Glaze" friable bond which permits an increase in the ratio of cutting grain to bond.

PIONEERS in the development of mounted points, mounted wheels, and internal grinding wheels.

For Fast Stock Removal, Long Life, Cool Cutting—

RADIAC*

RadiacPOR-OS-WAY—RadiacPARAFLEX—Radiac Mounted Points and Mounted Wheels—Radiac Internal Grinding Wheels—Radiac Abrasive Cut-Off Machines and Discs.

A. P. DE SANNO & SON, INC., 464 Wheatland Street, Phoenixville, Penna., Since 1893

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*T. M. Reg. U. S. Pat. Off.

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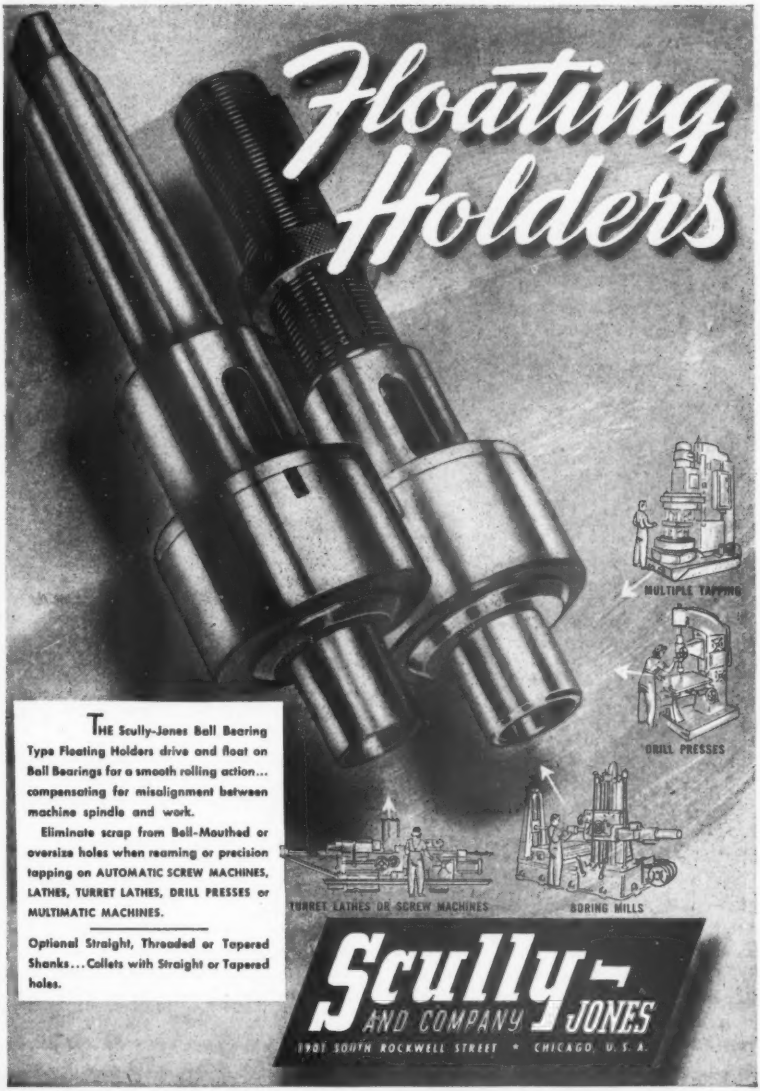
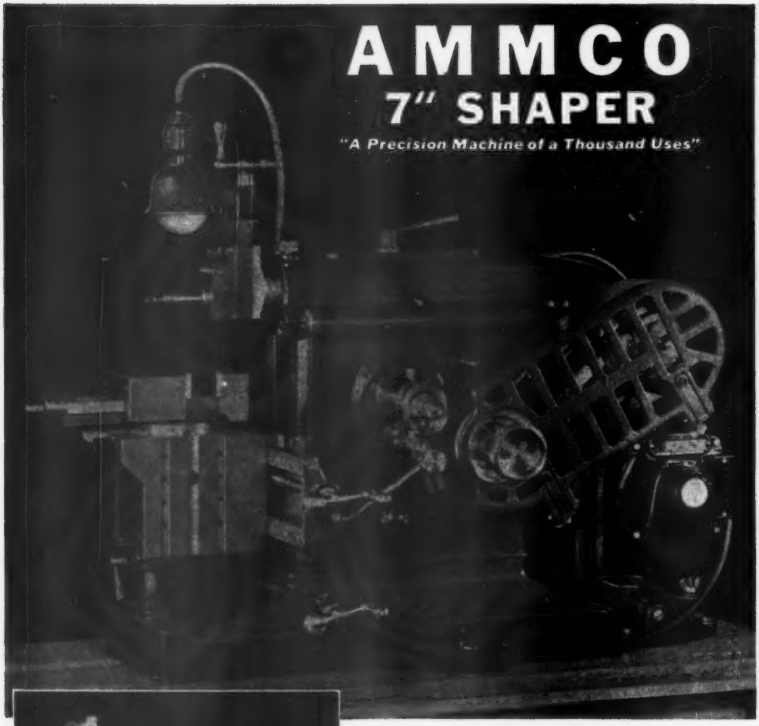

Floating Holders
MULTIPLE TAPPING
DRILL PRESSES
TURRET LATHES OR SCREW MACHINES
BORING MILLS
THE Scully-Jones Ball Bearing Type Floating Holders drive and float on Ball Bearings for a smooth rolling action... compensating for misalignment between machine spindle and work.
Eliminate scrap from Bell-Mouthed or oversize holes when reaming or precision tapping on AUTOMATIC SCREW MACHINES, LATHES, TURRET LATHES, DRILL PRESSES or MULTIMATIC MACHINES.
Optional Straight, Threaded or Tapered Shanks... Collets with Straight or Tapered holes.
Scully-Jones AND COMPANY
1901 SOUTH ROCKWELL STREET • CHICAGO, U. S. A.

AMMCO
7" SHAPER
"A Precision Machine of a Thousand Uses"



IT'S PORTABLE

- **Saves time and steps!**
- **Can be moved from job to job in tool and die shop!**
- **Just wheel up to bench--plug in--and go to work!**

On jobs requiring a stroke of 7" or less, the AMMCO 7" PRECISION SHAPER will enable you to save a lot of time and expense in a set-up which would be required for larger shapers. Furthermore, the AMMCO will enable you to get away from the cost of operating a big shaper on small work.

Portable Cabinet model enables this shaper to be moved about the shop.

•

Write today for specifications and prices

ARMY E NAVY

AUTOMOTIVE MAINTENANCE MACHINERY CO.
2100 Commonwealth Ave.—North Chicago, Illinois, U. S. A.

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LENGTHEN TOOL LIFE WITH CIRCULAR RELIEF GRINDING!

ONE MACHINE and ONE OPERATION
Does The Whole Grinding Job!

Today it is of paramount importance to save both tools and time. CIRCULAR RELIEF GRINDING can make your tools last longer, and simplify your grinding operations, too. This new grinding method requires but ONE MACHINE and ONE OPERATION. By *following the contour* of the tool, no precious metal is needlessly cut away. Result: Fewer grindings needed, time is saved and tools last longer. Send for circular and get the whole story. You'll be glad you did!

Here's Why Tools Last Longer When
CIRCULAR RELIEF GROUND:

Note from diagram how CIRCULAR RELIEF GRINDING *follows curve* of tool, grinds right up to cutting edge and does not cut away valuable metal supporting the cutting edge.

Write for Complete Details!

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TOOL ENGINEERING COMPANY
1261 W. Fourth St. **Cleveland 13, Ohio**

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You can get immediate shipment from a complete stock of all models and all sizes of A.G.D. Adjustable Snap Gages.

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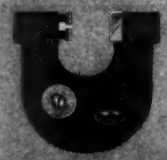
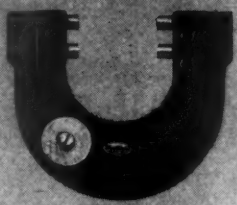
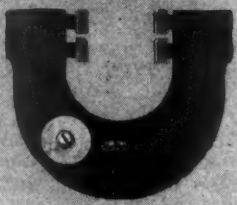
State Frame Model and Frame Size. Stipulate whether gage is to be set and sealed. Give complete marking instructions if set and sealed. For specifications see Sheffield Handbook No. 42-2, pages 150-153.



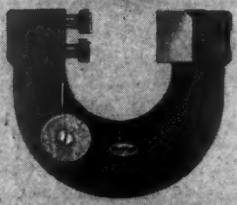
A.G.D. MODEL SMC



A.G.D. MODEL A



A.G.D. MODEL SB



A.G.D. MODEL SC

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THE SHEFFIELD CORPORATION

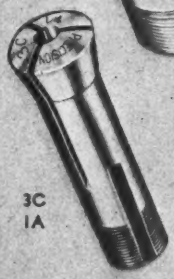
Dayton 1, Ohio, U.S.A.

MACHINE TOOLS — GAGES — MEASURING INSTRUMENTS — CONTRACT SERVICES

WHEN COLLET WORK IS INDICATED - SPECIFY

Precision Collets

5C



3C
1A

480
(AC-50)

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GUARANTEED UNCONDITIONALLY, AND AVAILABLE IN THE WANTED MODELS FOR MOST IMPORTANT LATHES INCLUDING SOUTH BEND, ATLAS, LOGAN, SHELDON, ETC.

MODEL 3AT for 10" Atlas, Logan, 12" Craftsman, No. 700 Powr-Kraft • MODEL 3C for 8 & 9" South Bend, 12" Clausing, Hardinge No. 3, 10" LeBlond, etc. • MODEL 1A for 8 & 9" South Bend • MODEL 5C for 9", 10", 16", 18" South Bend. Also Sheldon, Schauer, Sebastian 1" Capacity, etc. • MODEL 4C for 14½" South Bend. Also Sheldon, Hardinge No. 4, Elgin ¾" Capacity, etc. • MODEL 480 for Logan Screw Machine, Turret Lathe and attachments. Also Warner & Swasey No. 1, etc.

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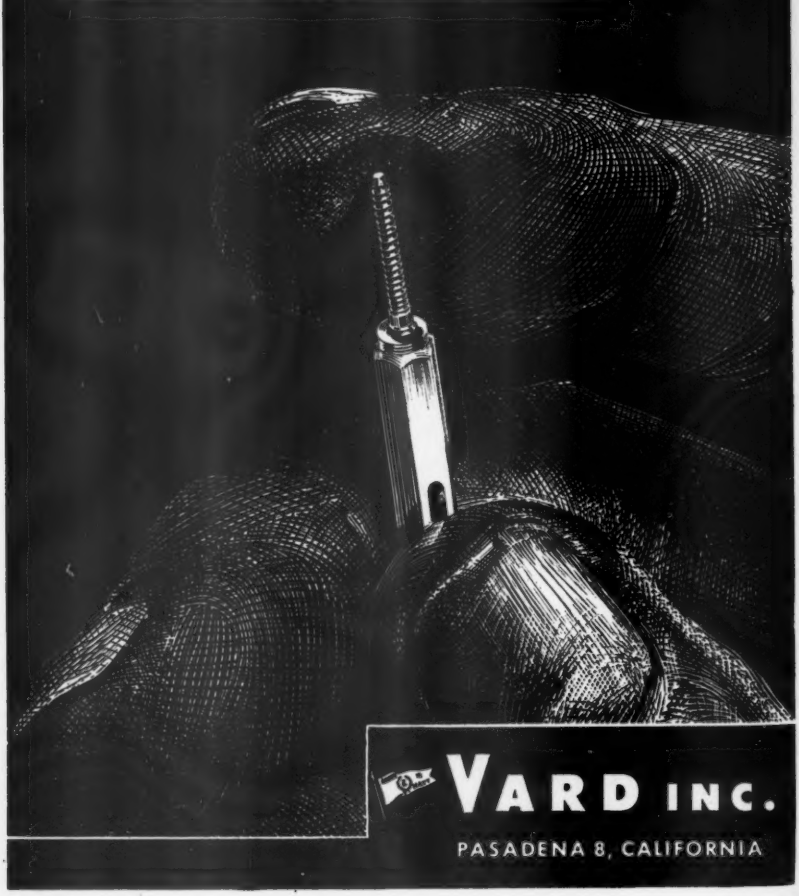
GENERAL DIE-STAMPING-TOOL COMPANY

PRECISION COLLET DIVISION 265 Canal Street, New York 13, N.Y.

THREADED PLUG GAGE

Threads smaller than the papillary ridges of a finger, ground to an accuracy of .0001 of an inch—that's what you get when you buy a VARD 0-80 NF Threaded Plug Gage ☆ We specialize in the manufacture of extra fine, Right or Left Hand Threads, special thread forms and extreme tolerance gages ☆ In some of the standard thread sizes in NEF, NF and NC gages, from sizes 0-80 to 1½ in., we can supply gage members out of stock. These fine threads as well as special threads can also be obtained in any size ranging from 0-80 to 12 in. and can be made to fulfill your requirements. Deliveries are being handled in a reasonable period of time ☆ Write for more complete information on any VARD products.



VARD INC.

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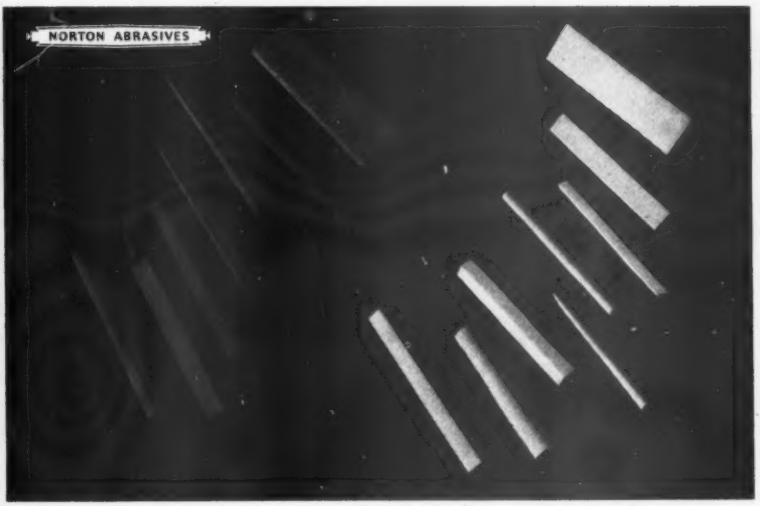

They Pay Big Dividends

FOR HAND-STONING TOOLS, India and Hard Arkansas Oilstone Shapes pay their way hundreds of times over through faster, better, more cuts from the bits, drills, reamers, and millers they sharpen.

The resulting increased output from the keener edges produced can easily run into hundreds—yes, thousands—of dollars from a tiny investment in some of these precision oilstones (say 75 cents for a rough average).

Whether all your cutters are sharpened at a central location under a trained tool engineer or touched up right at the machine, by all means *bring up the final edge by hand stoning.* It pays amazing dividends in metal and time saved.

AND IN DIE FINISHING, also, these oilstones are indispensable. The great choice in shapes and grits, from coarse India to the unmatched fineness of the Hard Arkansas Stones, makes it possible to impart any degree of finish desired to the most intricate and expensive dies.

Ask our Field Engineer or your friendly distributor's man about them.

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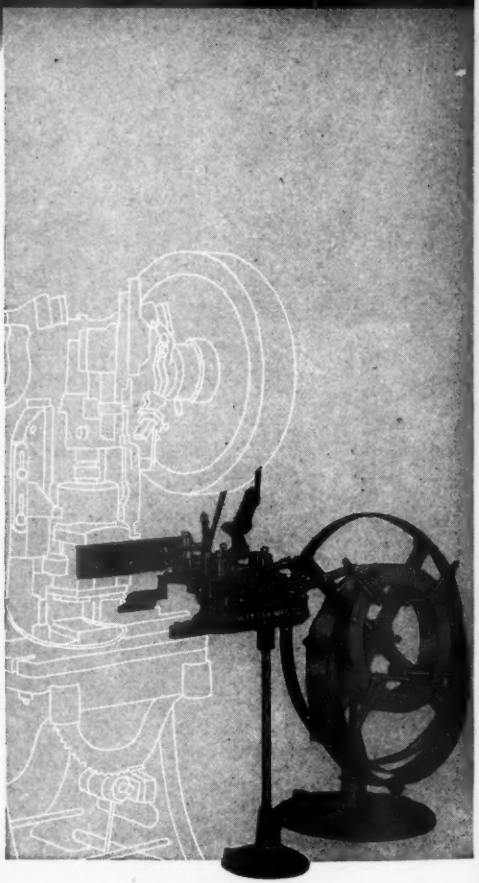
Our Punch Presses Are More Flexible And Productive With WITTEK *Automatic* Roll Feeds And Reel Stands

Manufacturers of metal stampings facing problems in the feeding of coiled strip stock to punch presses will find that Wittek Automatic Roll Feeds and Reel Stands conserve man-hours and achieve new high production levels.

Providing an improved and simplified method of punch press operation, Wittek Automatic Roll Feeds and Reel Stands insure rapid, safe and accurate feeding under all conditions. Made in four different types to meet all automatic feeding requirements. Write for complete details. Wittek Manufacturing Co., 4305-15 West 24th Place, Chicago, Ill.



WITTEK WMCO *Automatic* ROLL FEEDS and REEL STANDS

For All Makes and Sizes of Punch Presses

More Accurate Internal Finishes

in Less Time at a Lower Cost—With the Sunnen Precision Honing Machine

This popular, low-cost machine is guaranteed to hone internal cylindrical surfaces to within .0001" and produce a super-smooth finish of 2 to 3 micro-inches. In actual practice, *accuracy has been held to within .000025" on production jobs.*

In addition, production has been increased — *in some instances up to 500%* — with fewer rejects and absolute interchangeability of parts.

Wide range — handles internal diameters from .185" to 2.625". Corrects errors of out-of-roundness or taper caused by previous operations. Facilitates duplication of sizes. Does not require skilled labor. Write for free bulletin.

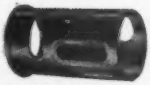
Typical Jobs

Stainless Steel Load Compensator Valve Seat. Hole is honed to .0002" limit.

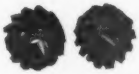
Idle Valve Guide. Honing after grinding holds a .0002" limit necessary for accurate idling.

Shell Loading Die.

Aircraft Valve Tappet Roller. Honed after grinding to give 100% bearing surface.



Aircraft Carbureter Operating Valve Sleeve. Sunnen honing eliminates distortion from assembling operation.



Automobile Distributor Shaft Gears. Taper removed at a rate of 80-90 per hour.

Compressor Yoke. Alignment maintained and better finish produced.

Mild Steel Clevis. Honing corrected errors of previous operations and maintained true alignment of two holes.

Roller Bearing Outer Race. Finish improved from 12 micro-inches to 2 micro-inches.

Bearing. A very small part. 2 micro-inch finish necessary.

Carbureter Idler Pump Smooth, straight-line finish in blind hole prevents pistor leakage.

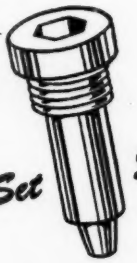
Ceramic Insulator. Honing used to eliminate roughness inside ceramic tube.

SUNNEN

SUNNEN PRODUCTS COMPANY
7947 Manchester Avenue, St. Louis, Mo.

TOUGH But Not BRITTLE!

Safety SUPER-DUTY Set Screw



An unusually strong set screw with all threads die cut — class 3 fit. The sockets are accurately broached, clean and free from grit. The screw is made from special alloy steel, which has been heat treated for maximum toughness, with a tensile strength of 225,000 lbs. to the square inch. The Safety Super-Duty is furnished in any style point shown below.

NATIONAL GRINDING WHEELS

Pay for themselves with longer life, higher grinding speeds and fewer breakdowns. They are investments which pay big returns on production work. Mounted wheels for use in Pattern Shops—Die Shops—Foundries—Auto Body Plants—Plant Tool Rooms—Garages—Rubber Plants—Glass Mfrs.—Textile Mills—Potteries and Home Workshops.

MANUFACTURERS SUPPLY COMPANY
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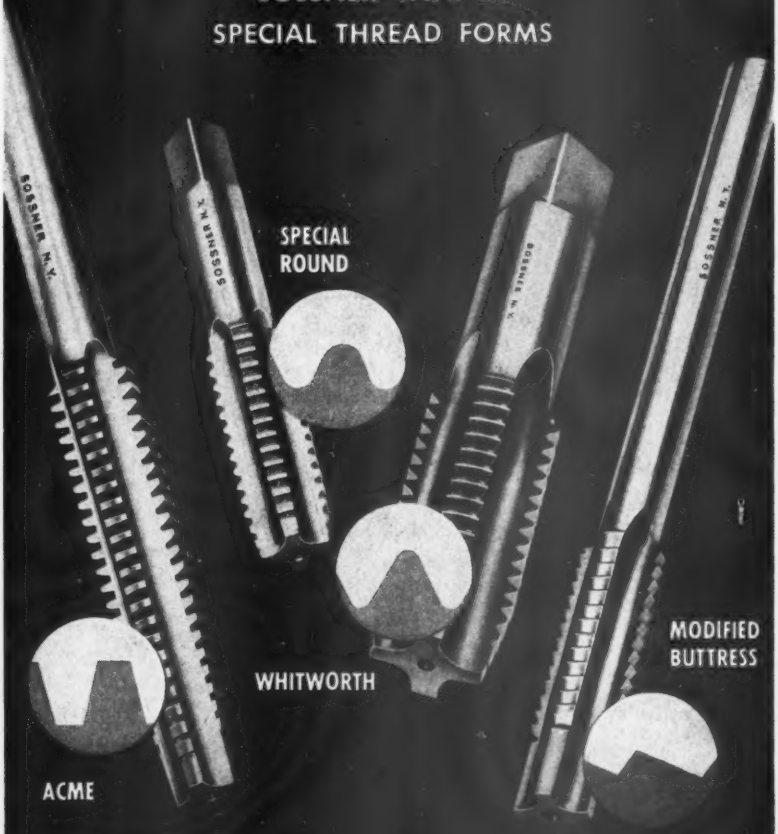
34 YEARS OF PRECISION WORKMANSHIP, RELIABILITY, PERSONALIZED SERVICE

SOSSNER TAPS IN
SPECIAL THREAD FORMS



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SOSSNER

161 Grand Street, New York 13, or 27 Broadway, Lynbrook, N. Y.

HERE'S THE

New Model Nichols Miller

Here's the New Model of one of the most versatile precision milling machines on the market.

Besides conventional milling, the Nichols Miller performs dozens of unusual operations — such as profiling, boring, facing, diamond wheel-grinding — *to tolerances in tenths.* Rise-and-fall spindle arrangement and a full line of attachments make the Nichols especially valuable for the toolroom or laboratory.

Worth remembering: Several thousand of these millers are in operation the world over — and we've never required a full-time service man!

WORKING SURFACE: 6¾" x 21", or 6¾" x 30". RANGE: Longitudinal, 10" or 19"; Transverse, 7"; Vertical-Knee, 13½"; Spindle Rise and Fall, 4½". STANDARD SPEEDS: to 2400 RPM. SPECIAL SPEEDS: to 5000 RPM.

Also Available—Nichols Millers for special requirements. Nichols Double-Spindle Millers for high-production needs.

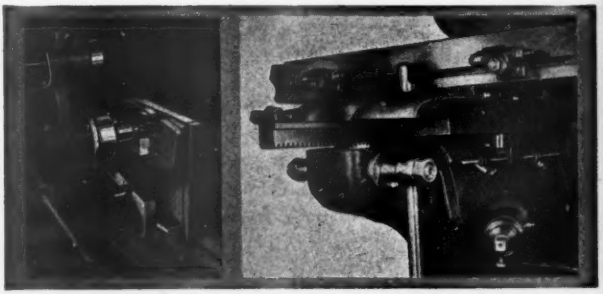
Immediate Deliveries—Send today for descriptive literature and free 86-page Handbook of unusual applications.

EXAMPLES OF NICHOLS VERSATILITY

(Left to right)

PROFILE MILLING, using template and follower, with remarkable ease of control, workpiece under full view.

RACK AND PINION TRANSVERSE FEED, available in place of standard feed screw for rapid motion on drilling, end-milling and boring operations.



Manufactured by W. H. NICHOLS & SONS, Waltham, Mass.

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2 to 3 days

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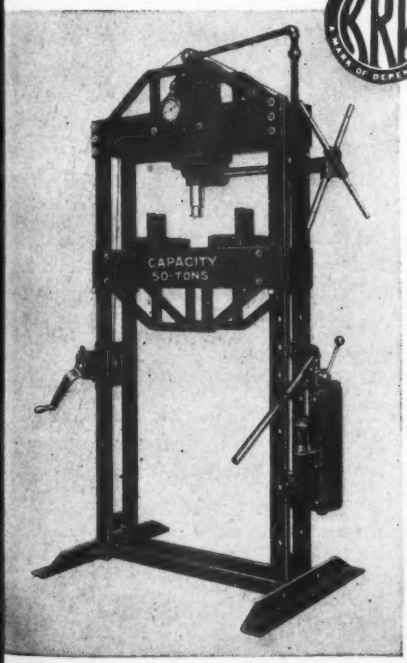


KRW — SINCE 1918 — A MARK OF DEPENDABILITY

IF YOUR ORDER CARRIES A PRIORITY OF AA-4 OR BETTER

● With the necessary Priority rating, we can make immediate delivery (2 to 3 days) on all standard model KRW Hydraulic Presses, and quick delivery (2 to 3 weeks) on special built-to-order hydraulic presses. KRW's modern plant and expanded facilities make this possible. If you want action, order a KRW—the hydraulic arbor press that is engineered for war production. Standard models are made in 25, 50, 60 and 75-ton capacities. Write for our new bulletin describing both standard and special presses.

K. R. WILSON

10 LOCK ST., BUFFALO 2, N. Y.

Retracting and Repositioning Work Within .0002 OF AN INCH—By Push Button

The most frequently needed function in a precision boring machine is that of retracting the work to facilitate measuring and tool setting.

In the DeVlieg Jigmil, this function is automatic—by fingertip control. Operation of a push button unlocks the table and moves it by rapid traverse to the desired position for measuring. For repositioning, operation of a single push button will cause the table to return to its cutting position by rapid traverse, stopping and locking automatically. Uniformity of selected position for stopping and locking is dependable within .0002".

The DeVlieg Jigmil is a new type machine—has the spacing accuracy of a Jig Borer — Performance Qualities of a Milling Machine — Convenience and Flexibility of a Horizontal Boring Mill. All control is so centered and organized that the operator never has to take his eyes off the work.

Thus, the Jigmil fulfills the machine tool ideal — a powerful and accurate extension of the operator's hand.

Many machines show 75 per cent greater average daily productivity.

DE VLIEG MACHINE COMPANY
450 FAIR AVE. FERNDALE (DETROIT) MICHIGAN

Write for Circular
DEVLIEG MACHINE TOOLS

DOUGLAS *Precision* MACHINES

The Douglas Miller combines rigid, well balanced design with convenience of control making it particularly suitable for accurate work in tool room as well as for general production. It is available in plain or universal type.

Showing operation with Universal Milling attachment on tool room job producing a production fixture.

Showing operation with four cutters machining alloy steel for high precision aircraft parts

FOR TOOL ROOM AND PRODUCTION

Prompt Delivery to War Plants

The Rotorex Universal Tool and Cutter Grinder will accurately perform all kinds of tool grinding operations. Readily interchangeable attachments are available to set up machine for single purpose jobs such as cylindrical, internal and radius grinding.

Operation showing set-up for internal grinding.

Operation showing set-up for sharpening straight gash hobs.

DOUGLAS MACHINERY CO., Inc.

150 BROADWAY • NEW YORK, N. Y.

New SUTTON *Super* FEEDER

A different and better feeder for trouble-free, low-cost production

DIFFERENT—because it grips stock with spring steel ***in compression,*** not in tension as in ordinary feeders.

DIFFERENT—because multiple springs exert equalized gripping pressure *directly* on stock.

BETTER—because multiple springs grip stock over a much larger area giving better, more uniform grip with less stock marring, less wear on feeder.

BETTER—because it handles round, square or hex stock to machine capacity.

ECONOMICAL—because a few hammer taps restore spring tension, giving longer tool life, lower tool cost.

COSTS NO MORE THAN ORDINARY TYPE FEEDERS

SUTTON TOOL CO., 2895 W. Grand Blvd., Detroit 2, Michigan

Send for Bulletin No. 11. *See our Representative*

SUTTON Diamond Grip **COLLETS**

Broaching by *American*

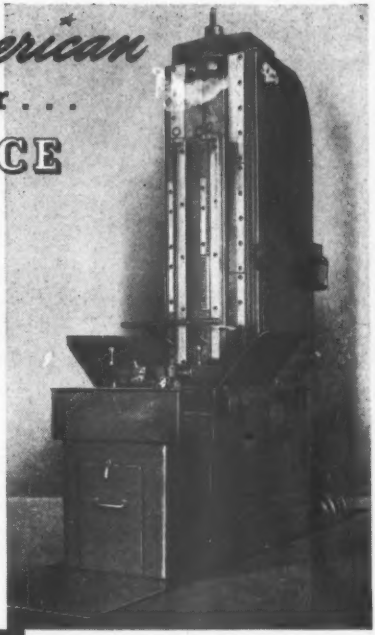
PROVEN in war . . .

Ready for PEACE

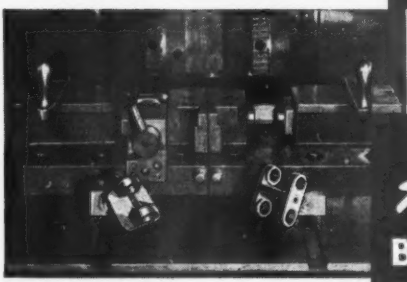
When war's demands made necessary precision production on a mass production basis, many leading production engineers turned to broaching — by *American*.

A typical example: finishing the surfaces between the bosses on aircraft universal joint parts. American Broach and Machine Company engineers—identified with broaching since the turn of the century—assumed responsibility for complete broaching equipment for this job. An *American* SB-54-10 single ram machine with receding work table was provided, equipped with a two station fixture designed to broach two end parts and one center part for a balanced production in each two machine cycles. (See illustration below.)

This is but one of the many war jobs where broaching by *American* is providing faster, more accurate and more economical production. When production planning is undertaken for peacetime products, *American's* complete service — machines, tools, and engineering — will be available.



(Above) *American* SB-54-10 Machine. Loading and unloading are synchronized with the machine cycle so that down time is zero . . . production high . . . finish excellent.



(Above) Parts broached in this operation are shown installed in the fixture, with two completed parts lying on the front of the table.

Broaching is better the *American* way—proven in war, ready for peace!

Use proper and sufficient lubrication when broaching. It is cheap life insurance for broaching tools.

American

BROACH AND MACHINE CO.

ANN ARBOR, MICHIGAN

•

BROACHING MACHINES
PRESSES
BROACHING TOOLS
SPECIAL MACHINERY

DIVISION OF

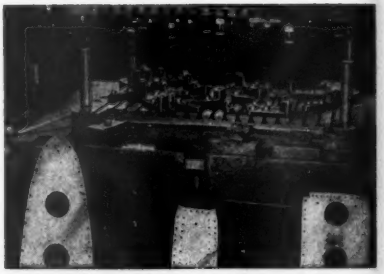
S

ADJUSTABLE DIES
SPEED WAR PRODUCTION

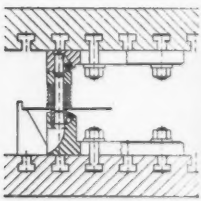
INCREASE HOURLY PRODUCTION—REDUCE "DOWN" TIME

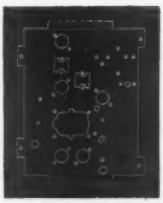
Whistler adjustable die set-up for 12 foot power brake. These same punch and die units can be quickly rearranged for other patterns.

Whistler Adjustable dies are saving the day in war plant "speed-up" schedules by...saving weeks of time normally required in single purpose die making...units can be used over and over in different patterns...new set ups on or off the press in minutes ...all parts interchangeable...work on any type press...perfect precision on long or short runs...no special tools and new workers quickly learn to make press changes.



Another grouping of Whistler Adjustable Dies illustrating re-use of same units. Note close grouping of perforations.





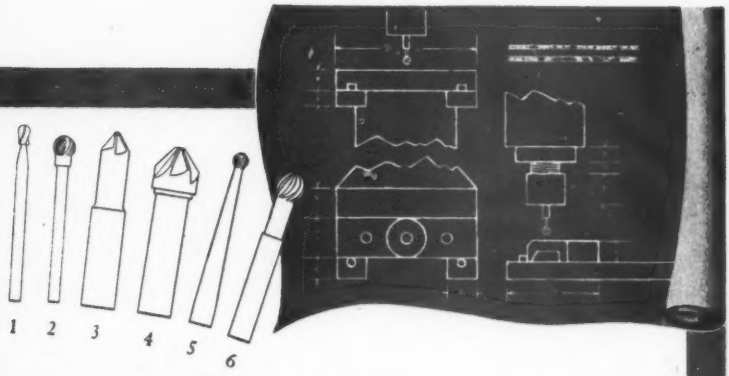
Side view showing construction detail of U-50 Whistler Adjustable Punch and Die unit and typical example of perforated and notched piece produced by Whistler Dies.

Over 25 Years of Tool and Die Making Experience

S. B. WHISTLER & SONS, Inc.

752 756 MILITARY ROAD BUFFALO, N. Y.

Every Production Executive needs this fully illustrated catalog. Sent upon request.



TO YOUR SPECIFICATIONS

Carbide-tipped ROTARY CUTTERS

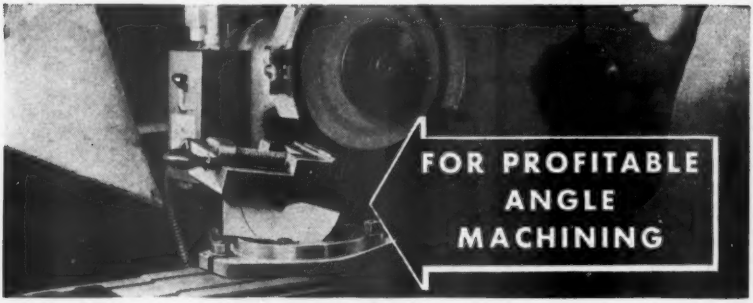
We are now equipped to turn out custom-made CARBIDE Rotary Cutters to meet your most exact requirements—precision ground for precision performance. Send your sketches or blueprints to M. A. Ford Mfg. Co. Inc., 739 W. First St., Davenport, Ia. No obligation of course.

(1) Carbide end mill—1/8" diam. —1/16" radius end.
(2) Carbide ball—1/4" diam. 1/8" shank, 2 3/4" overall length.
(3) Carbide end mill—2 flute, RH operation.
(4) Carbide chatterless countersink—3/8" shank.
(5) Carbide ball—5/16" diam. 1/4" shank, 3 1/4" overall length.
(6) Carbide ball—precision ground .375" diam. (+.0000) (−.0002)

Ask for your copy of catalog showing our standard line of Carbide Cutters.

FORD

The mark of a GOOD File



ALL *Angle-Set* JOBS MADE EASY

PRECISION ANGLE GRINDING · MILLING · DRILLING · SHAPING · DIE-SINKING · SAWING · FILING · REAMING · SLOTTING · CHECKING

. . . and many other speedy Angle Set-ups for precision Toolroom or Production Operations. You save many vital hours . . . you cut costs four ways: (1) By speedy angle set-ups — (2) By angle accuracy that reduces spoilage or "rejects" to a minimum — (3) By making your present equipment adaptable to practical angle machining for every requirement — (4) By simplifying angle set-ups so that every operator is capable, with WESSON Universal Vises, of performing precision angle operations fast. Super-rigidity, wide range capacity, compactness, finest quality, precision engineered . . . a BIG value, at reasonable cost. INVEST NOW!

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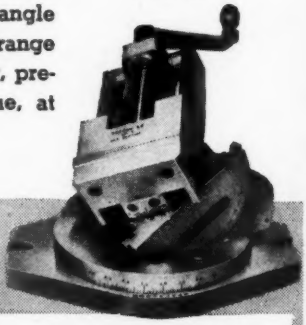

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BUILT TO WESSON STANDARDS OF QUALITY AND PRECISION

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Detroit 2, Michigan

Please send me illustrated bulletin of WESSON Universal VISES and ANGLE PLATES.

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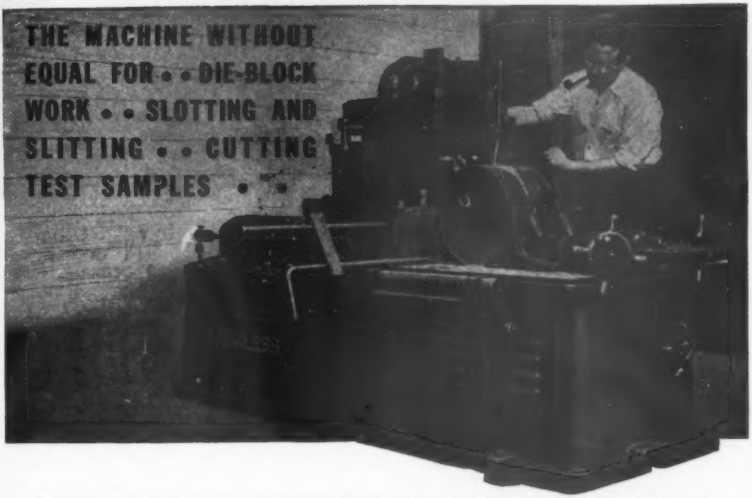
THE PEERLESS VERTICAL SAW



CUTS 10 x 24-INCH STOCK WITHOUT TURNING—LOADED BY CRANE

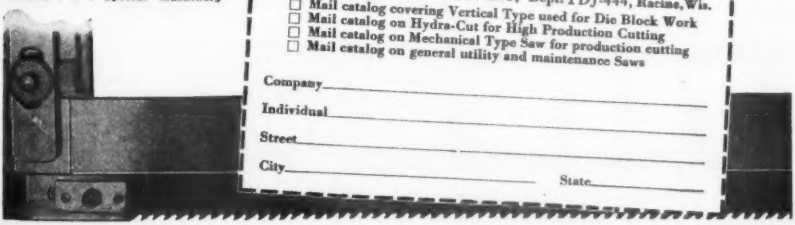
THE large work table permits loading the Peerless Vertical by crane. It is the only hydraulically controlled metal-cutting Saw that will handle 10x24 inch stock without turning the work

The Peerless cuts square and true all the way through. Only a few thousandths need be allowed for planing down. That enables tool and die makers to use scrap pieces for smaller dies, strippers and stripper plates and to salvage old die blocks. Critical stock is saved!

Mail the coupon for estimate of cutting time on your toughest operation and full details of the Peerless Vertical Metal Cutting Saw.

PEERLESS MACHINE COMPANY, 1600 Junction Avenue, Racine, Wisconsin

Builders of Fine Tools for Thirty Years—Acro-Matic Grinders . . . Hydraulic Pumps . . . Blades . . . Coolant . . . Special Machinery



PEERLESS MACHINE COMPANY, Dept. TDJ-444, Racine, Wis.

- ☐ Mail catalog covering Vertical Type used for Die Block Work
- ☐ Mail catalog on Hydra-Cut for High Production Cutting
- ☐ Mail catalog on Mechanical Type Saw for production cutting
- ☐ Mail catalog on general utility and maintenance Saws

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Will CUTBACKS AND CANCELLATIONS find you in a favorable tool position?

Yes!... IF YOU USE TECO Cemented Carbide!

"Watch your inventory!" is the order of the day as plants prepare to meet changes in production. To keep your cutting-tool inventories at lower levels and production at higher levels, use longer-wearing TECO Cemented Carbide for turning, boring and facing operations.

TECO Cemented Carbide has surpassing resistance to wear and breakage. It holds cutting edges longer, yields considerably more pieces per grind and much greater production per tool. Therefore, you make fewer replacements on the machine—need fewer reserves in the toolroom.

Prove these facts in your own shop. Replace present tools with TECO Cemented Carbide on any job—then compare output. Prompt delivery can be made on tools and blanks, in grades, styles and sizes for most machining needs. Outline your requirements. Write for catalog and new price list.

TUNGSTEN ELECTRIC CORPORATION, 574 39th Street, Union City, N.J.

Branch Office: 2906 Euclid Avenue, Cleveland, Ohio
Representative: Architects & Builders Bldg., Indianapolis, Ind.

TECO Pioneers in Tungsten Carbides for over a Quarter Century **CEMENTED CARBIDE**

ow modern industry

Facilitates Production—Saves Millions

. . . with small, compact, low-cost

Delta Machine Tools

● Use of these portable machines for heavy-duty production was a pre-war discovery . . . adopted in almost every branch of industry to meet the war crisis . . . and now an integral part of American manufacturing methods for the post-war era.

Here's how you facilitate production

Portability—Delta machines can be moved instantly.

Flexibility—Revise layouts at will, to get best sequence of operations.

Adaptability — Small and compact, Delta machines can be added to present layouts to save waiting, to provide extra operations during idle time, etc.

Special-Purpose Machines —Built quickly at little cost, out of standard Delta elements.

Here's how you save a lot of money

Low First Cost—Frequently, Delta tools to do a given job cost a fraction as much.

Low Fixed Charges—Delta equipment holds down your fixed overhead.

Lower Power Cost—Delta tools, employing smaller motors, frequently cut power cost 30% to 60%.

Low Labor Cost — Savings up to 80%. Minimum training problems.

Low Maintenance Cost — Practically no upkeep.

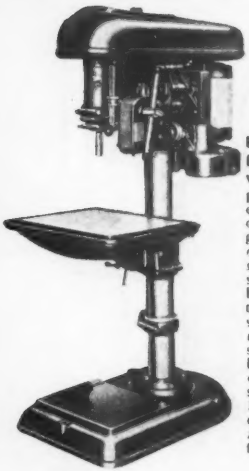
Here's your assurance of dependability . . durability

Quantity Production—Cost savings due to modern production methods applied to a large volume of standard models — not to short-cuts in quality.

Latest Production Equipment — The finest available. Rotating parts *dynamically balanced*. Ball bearings *preloaded*. All spindles, arbors etc. *precision-ground*. Ball-bearing seats, etc. *diamond-bored*.

The Delta-Milwaukee line is diversified . . . *TURN THE PAGE*

✓ New economies in hi
...with low-cost, dependable De



Delta Power-Feed Drill Presses

Worm-driven power feed operates directly off motor — giving 8 *rates of feed for each spindle speed*. One swift hand motion brings drill down to work. Automatic stop and spindle return. *Instant* switching from heavy power-feed operations to sensitive hand drilling. 17-inch single spindle drill presses available in 24 different models.

Delta 14" Floor-Type Drill Press

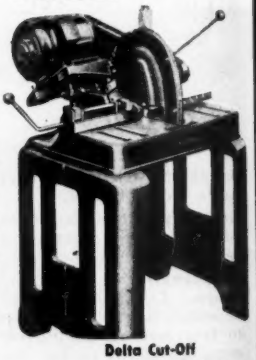
Delta's patented construction provides *both* a self-aligning drive and a free-floating spindle. Many outstanding features, including smooth-working table-raising mechanism, built-in depth gauge, streamlined safety belt guard, quill with 5" stroke or travel, etc.

Delta 6" Abrasive Belt Finishing Machine gives you top efficiency

Handles dozens of sanding, polishing, and finishing operations — polishing and sizing metal parts; finishing and polishing die castings; finishing, finning and surfacing plastic parts; etc. Set horizontally or vertically. Double-seal ball bearings. Many other quality features.

Delta 14" Metal-Cutting Band Saw

Cuts anything from carbon steel to asbestos — has dozens of uses (4 metal-cutting speeds, 1 wood-cutting speed). Delta features: *10 New Departure Self-sealed ball bearings. Heavy table, 14" x 14". Simple, foolproof gear drive. Guides* give micrometer accuracy. *Safety features* complete.



Delta Cut-Off Machine eliminates expensive finishing

Cuts plastics, non-ferrous metals, etc. to exact length with polished smoothness.

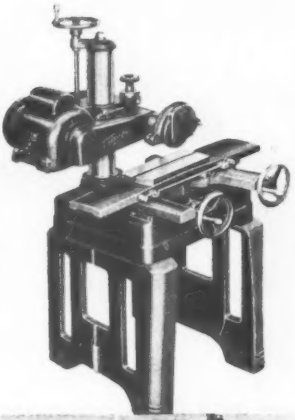
DELTA-MILWAUKEE .. *pioneers of small, compact.*

high-production tooling

Delta Machine Tools

Delta Floor-Type Multiple-Spindle Drill Presses

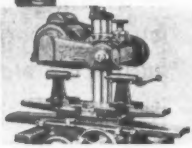
4-spindle model illustrated. 2-spindle model also available with one-piece table. Floor types with sectional tables: 3-, 4-, 5-, 6-, and 8-spindle.



Delta Toolmaker Surface-Grinder gives dependable, trouble-free results

This husky, big-capacity grinder is a "heck of a lot of machine for the money," say delighted users. Ideal for surface grinding, tool sharpening, etc.

Designed for ease and speed of operation. Convenient controls . . . wide graduations on micrometer for close settings . . . unique wheel-adapter that saves on truing-up operations . . . many other features that assure you of creditable performance. 7x½" wheel, 1¼" bore.



With the Univise and Coolant Attachment . . . the first truly universal vise for grinding, drilling, and milling, this machine serves as a dependable, accurate Chip-Breaker Grinder. Holds the tool at any conceivable angle — accurately reset at a moment's notice.

With the Tool and Cutter Grinder Attachment . . . it becomes the latest development in Tool and Cutter grinding. Simple, accurate, and very low in cost. Delta construction features assure perfect alignment and freedom from play. Substantially built, machined to close tolerances.

Delta Carbide Tool Grinder Runs True

Free from vibration, for delicate grinding of carbide-tipped tools. Team it up with the Delta standard tool grinder for hogging down the steel shank.

Delta Tool Grinder with Twin-Lite Shields

gives you extra convenience, efficiency, safety.

Twin-Lite Safety Shields act as "built-in goggles," flooding the work with light.

DELTA MILWAUKEE Machine Tools

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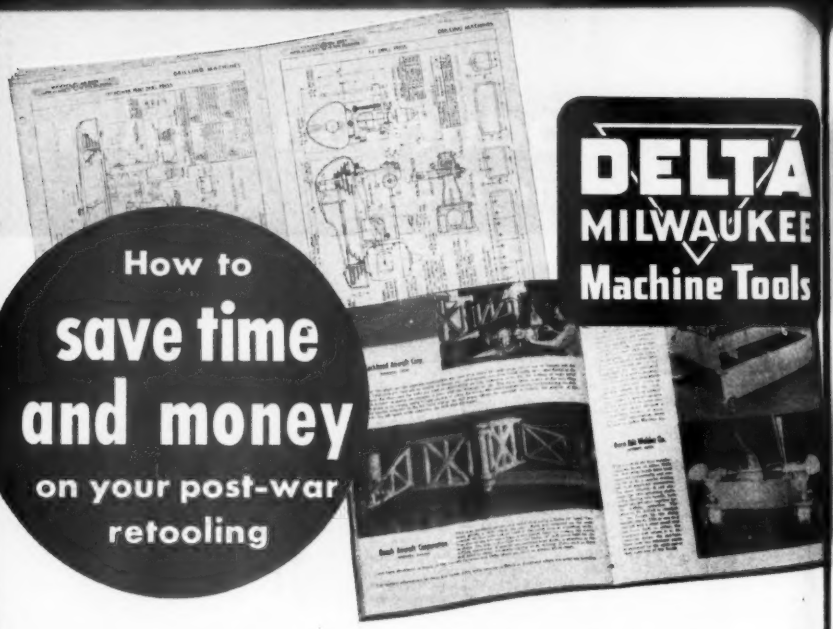
—coupon on next page

durable, low-cost machines for heavy-duty production work . . .



How to save time and money on your post-war retooling

— with high-production, low-cost special-purpose machines built from standard Delta Units...

Ingenious combinations of low-cost stock-model Delta tools — devised by production men in America's leading war plants — have written a new chapter in modern tooling practice. • Special-purpose machines, increasing production 200% to 600%, have been built at a fraction of the cost and in a fraction of the time ordinarily involved. This minimum capital investment, moreover, is flexible — being composed chiefly of standard elements. • This new free book pictures and describes a wide range of applications — actual, detailed case histories. Break your war-production bottlenecks — plan for an edge in post-war competition. Write for free copy.

M-9A

140 examples from War Production — in Delta's new 76-page BLUE BOOK

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Please send me free copy of your new 76-page Blue Book, and catalog of low-cost Delta tools.

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Send today for your free copies of these valuable books. Consult your Delta-Milwaukee distributor regarding priorities and deliveries (most Delta machines available on automatic priorities under MRO).

DEEP DRILLING *Goes Faster* WITH **OIL-HOLE DRILLS!**

Because of Oil at the Cutting Edge!

•

You'll never know what a big difference a drill can make in the time required to perform a deep-drilling operation until you use a drill especially designed for this purpose — an OIL-HOLE DRILL.

Having two oil holes which follow the twist of the drill the entire length of the shank, the OIL-HOLE DRILL delivers a constant supply of oil direct to the cutting edge, permitting the drill to be operated at a much faster rate of speed than the ordinary type of drill, without danger of overheating.

The oil, being forced through the drill under pressure, also automatically clears the chips away from the cutting edge and out through the flutes. This results in much smoother holes, because it eliminates the danger of scoring.

And besides, an OIL-HOLE DRILL has a life two to three times that of ordinary drills. So, if you are seeking faster production, better production, and lower-cost production in your deep-drilling operations, change over today to OIL HOLE DRILLS!

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All sizes from 3/8" to 3½" in diameter and up to 36" overall

Detroit Reamer & Tool Co.

2830 E. 7-Mile Road Detroit 12, Michigan

Manufacturers of

Oil-Hole Drills . . . Special Reamers . . .
Circularity Relieved Reamers and End Mills
***Also* Special Tools**

Are You Properly Emphasizing the *Savings Feature* of Your Plant's Payroll Savings Plan?

Now's the time to emphasize over and over again the *savings* feature of your Payroll Savings Plan. To press home to your people the need of building up savings—building them up not only in wartime but also in the years after the war. To point out that a bond cashed before its full maturity is a bond killed before giving full service to its owner—*or his country!*

Buying War Bonds, holding War Bonds, and keeping wartime savings mounting—all are vital. But no one of these is enough by itself. The *savings habit* must be carried over into the years which follow the war. For if, at war's end, we have 'flash-in-the-pan' spending, *everybody loses.* The spender loses, you lose, and the country loses! While a working public, convinced of the value of continued, planned savings is the soundest possible foundation for private enterprise of every sort.

WAR BONDS TO HAVE AND TO HOLD!

The Treasury Department acknowledges with appreciation the publication of this message by

Staff of the TOOL & DIE JOURNAL

★ LET'S ALL BACK
★ THE ATTACK . . .
★ WITH WAR BONDS!

This is an official U. S. Treasury advertisement—prepared under auspices of Treasury Department and War Advertising Council

CUTS JIG-BORING TIME 25%!

Read What Chief Tool Engineer Kennedy of Norge Division, Borg-Warner Corporation Says About

CENTERSCOPE

"We have found the Center Scope purchased from you several months ago, to be a very valuable addition to our tool room equipment.

"We have cut our jig boring time at least 25% which has avoided the necessity for sending any boring to outside shops.

"By having the bench men lay out their jigs and dies with a height gage or Johannsen Blocks and turning the job over to the boring mill hands, we have maintained closer limits on spacing and eliminated mistakes entirely.

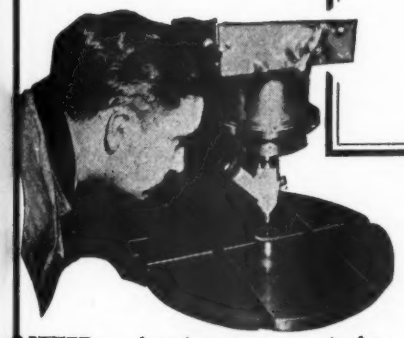
"Spacings within .001 are easily attained and closer tolerances are possible.

"The tool makers are all enthused about this instrument and join in our recommendation of it."

Yours for Victory!

NORGE DIVISION
Borg-Warner Corporation

G. P. Kennedy
Chief Tool Engineer



Speeds Locating ...Makes Accuracy a Habit!

ETTER work at lower costs — is the universal report from shops using nter Scope, the optical locating tool. time estimates are being reduced, beise Center Scope makes locating time rter and gets more work out of each chine tool, from bench drill to lathe jig borer.

nter Scope can be used without techal knowledge or training, and produces accuracy of plus or minus .0001" or better, the first time an operator uses it.

Used on any machine tool, it is a precision instrument, not affected by wear, temperature, or mechanical pressure.

Prices are attractive, too. Variable Center Scope, only $97 f.o.b. Milwaukee; Edge Block, $23 additional. For full information, write for Bulletin No. CS301.

Rotary Head Milling Machine
Autometric Jig Borers
Center Scope

Kearney & Trecker
Products
CORPORATION
Milwaukee, Wisconsin
Subsidiary of Kearney & Trecker Corporation

Milwaukee Face Mill Grinder
Milwaukee Midgetmill
Milwaukee Speedmill

FEDERAL *Taperlock* PLASTIC GAGE HANDLES

MADE of light weight plastic material, Federal Gage Handles are lighter than any metal used, even one-third lighter than aluminum. This lightness permits a most sensitive "touch" with less fatigue in long continued use; an advantage appreciated by women inspectors.

They are highly satisfactory with glass gages; being so much lighter than metal handles, they reduce the danger of chipping and breakage.

Insulating properties help prevent transmission of bodily heat to gages which may affect accuracy.

Marking for identification is accomplished with the same marking tools used for metal gages.

Immediate Delivery

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00, 0, 1, 2, 3, 4, & 5—in Red, Green, Yellow, Black

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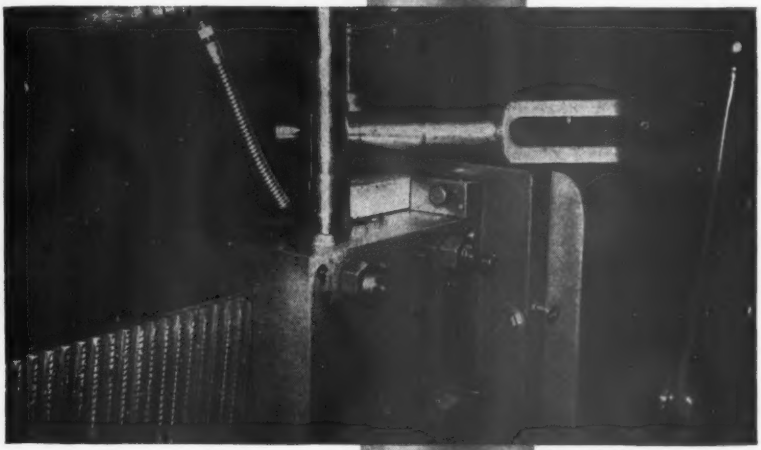
400 NORTH LEAVITT ST., CHICAGO, ILL.

Split Thousandths



This is a story of production, a story which is more than merely adequately handling a difficult job. It's typical of broaching's part in precision production.

The part shown is a Steel Spar Terminal. The job — to make more parts per hour with less tolerance than was ever thought possible before the war. The answer — a 3L Horizontal Hydraulic Broaching Machine with special broach which with a special fixture made production and precision a matter of seconds rather than hours — a matter of split thousandths rather than thousandths.

MEMBER BROACHING TOOL INSTITUTE

ARMY NAVY

LAPOINTE Machine Tool Company

HUDSON, MASSACHUSETTS, U. S. A.

Tools and gages to your specifications

Accuracy to thousandths . . . . . Yes, even millionths. Our complete inspection laboratory is scientifically air-controlled. The elimination of temperature variations assures positive accuracy to your specification.

Master gages measuring millionths of an inch enable us to build jigs, fixtures, gages, and precision parts to the most exacting Army and Navy requirements. Have our experienced toolmakers with an Army-Navy "E" reputation solve your tooling problem. Our 24 years of experience will save you time and costly errors.

The most modern machines and tools for producing special tools, gages and ground threaded parts are available to manufacturers with war orders. Reasonably prompt deliveries can be made. Send blueprints for immediate quotation and delivery schedule.

TOOLS & GAGES, INC

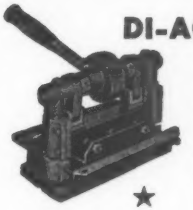
3113 EAST 93RD STREET · CLEVELAND, OHIO

Talk About PRODUCTION Without DIES!

4,000 PARTS per DAY with DI-ACRO Bender

"Enclosed pictures in our plant prove the DI-ACRO Bender will do a real production job. We are making 4,000 completed parts per day which is competitive to most Power Presses." (Name on Request.)

Here is an example of "DIE-LESS DUPLICATING" typical of a great variety of formed parts readily made with DI-ACRO Precision Machines, — Benders, Brakes, Shears. Picture below shows the DI-ACRO Bender making an acute right angle bend and photograph above shows the finished part formed to die precision. Women operating DI-ACRO units maintain a high out-put on production work.



DI-ACRO Shear

Squares and sizes material, cuts strips, makes slits or notches, trims duplicated stampings. 3 sizes. Shearing widths, 6", 9", 12".

DI-ACRO Brake

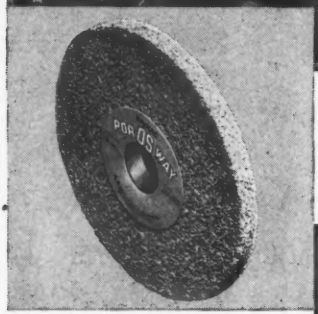
Forms non-stock angles, channels or "Vees". Right or left hand operation. 3 sizes. Folding widths, 6", 12", 18".

Send for Catalog

showing DI-ACRO Precision Machines and many examples of parts made with "DIE-LESS DUPLICATING".

O'NEIL-IRWIN MFG. CO.

315 EIGHTH AVE. SOUTH • MINNEAPOLIS 15, MINNESOTA



POR-OS-WAY usually produces so much faster when first tried that operators, satisfied with a reasonable improvement in results, don't push this wheel to the limit of its possibilities. Don't be easily pleased! Send for the Por-os-way booklet with the "prescription" blank for ordering a test lot. Then try THIS wheel and give it the works!

CHECK FOR CHIP CLEARANCE

Grinding wheels, just as twist drills, need clearance. Por-os-way's structure provides chip clearance NATURALLY.

IT'S THE 2-in-1 WHEEL

The same Por-os-way wheel—at a deeper cut—can often be used for rough grinding as well as finishing.

Por-os-way Users List Reads Like a Blue Book of American Industry. A few are:

E. C. Atkins & Co. · Bell Aircraft · Edward G. Budd Mfg. Co. · Buick Motor Division of General Motors · Kinner Motors, Inc. · Studebaker Corporation · Thompson Aircraft Products · Wadell Engineering Co. · Westinghouse Electric · Wright Aeronautical

THIS MAKES THE DIFFERENCE

It's easy to see the difference between an ordinary wheel (top) and a Por-os-way wheel(bottom). Por-os-way's extra porosity results in over 8 distinct operating advantages.

*T.M.Reg.U.S.Pat.Off.

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2 TO 5 TIMES MORE PRODUCTION PER MAN PER MACHINE

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POR-OS-WAY*

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Radiac POR-OS-WAY · Radiac PARAFLEX · Radiac Mounted Points and Mounted Wheels · Radiac Internal Grinding Wheels · Radiac Abrasive Cut-Off Machines and Discs

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(REG. TRADE NAME)

THREE POINT DESIGN

Fashioned to Order
Processed for Service
Built with Quality

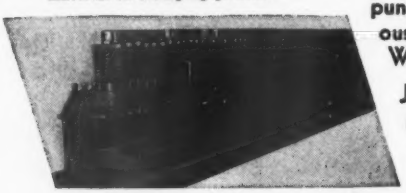
W. F. MEYERS CO. INC.

1016 14th Street • Bedford, Ind.

A SUGGESTION FROM WALES-STRIPPIT *Engineers*

Wales Type "B" Units for punching sheet material in stamping presses.

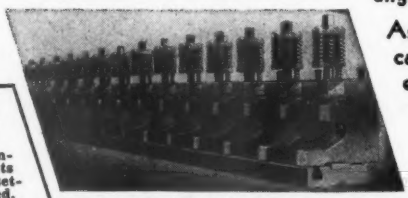
Before spending valuable time and effort designing and building special hole punching dies, check with Wales-Strippit engineers who may have solved your particular hole-punching problems by using various adaptations of standard Wales Hole Punching Units.



Wales Type "C" Units designed for punching angles and sheets on press brakes.

Join the hundreds of metal fabricators who make it a rule of calling on Wales-Strippit engineers *before* putting holes in sheets, channels, and angles *by any method.*

As a timely suggestion, call on Wales-Strippit engineers *FIRST.*



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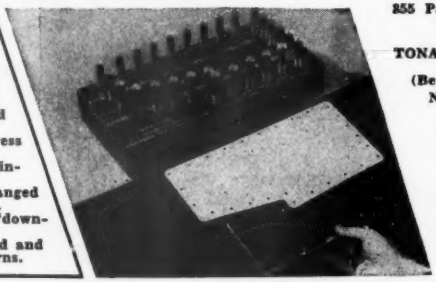

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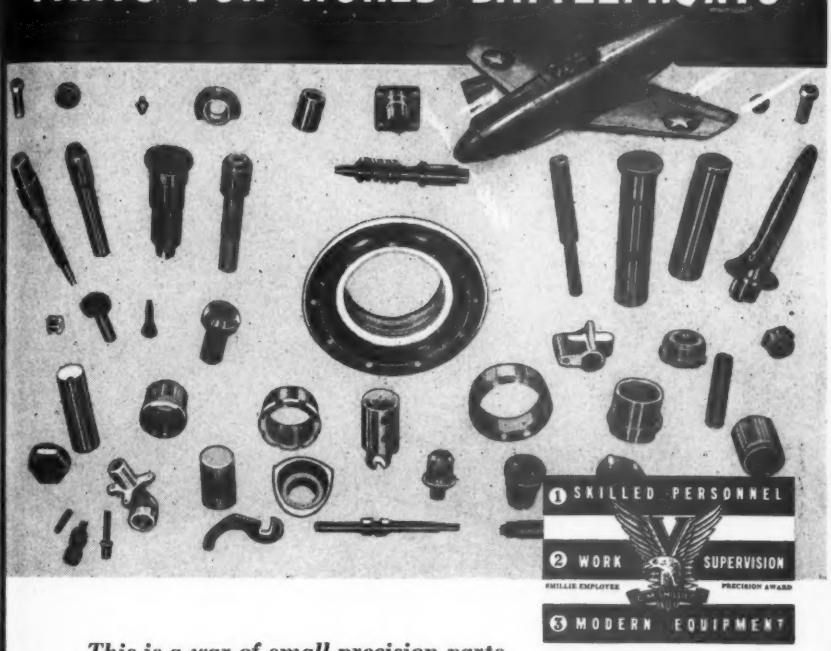

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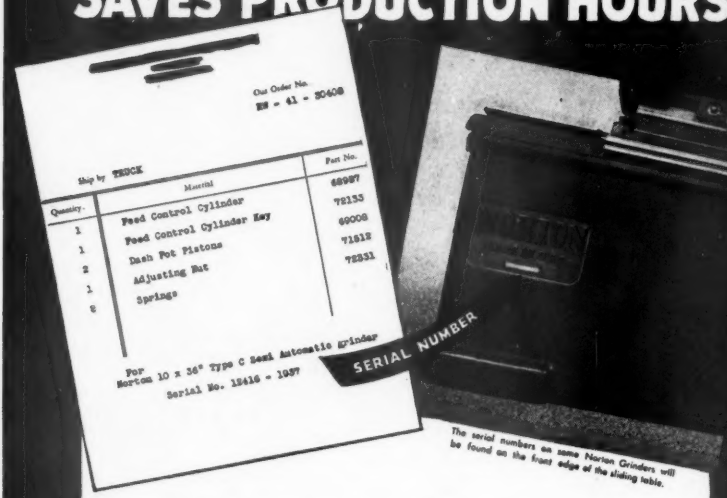

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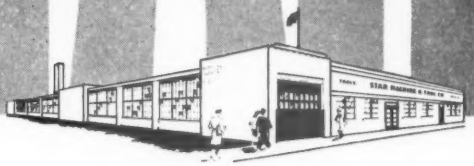

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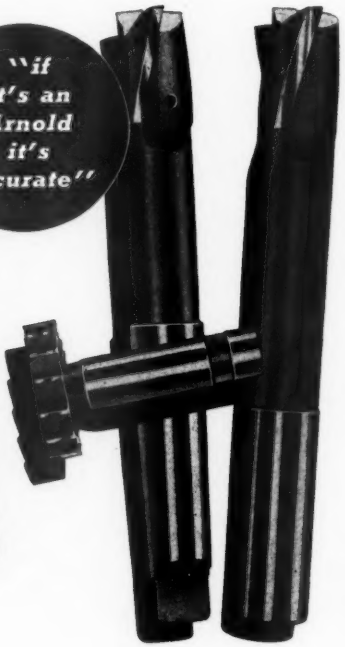

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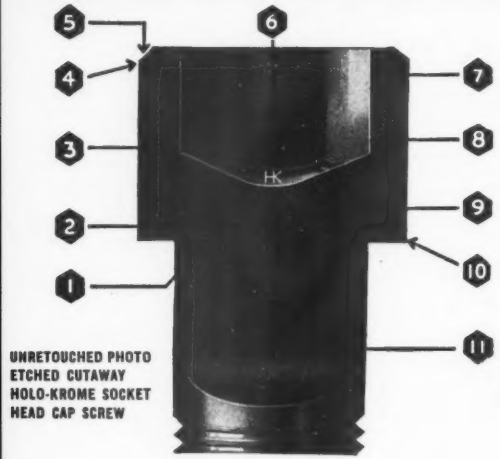

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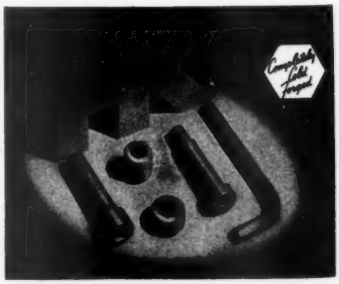

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THE TOOL & DIE JOURNAL

GEORGE J. HUEBNER • EDITOR, PUBLISHER

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MANPOWER is the topic of the day. The Armed Forces need men to train. Industry needs its trained men. The competition between these groups is not an equal one, the Selective Service having the authority to order induction.

Among the so-called "necessary" men of industry none is more urgently needed in his place than the tool maker, the die maker and the gage maker. That this is recognized, at least partially, is evidenced by a list of 13 vital occupations of "workers who cannot be replaced" recently made public by the Manpower Commission. The die maker heads the list—number 1 keyman—and the tool maker has 4th place. Actually there is no difference in importance because those two trades are representative of the several craftsmen upon whom rests the responsibility for the tooling required for production.

Tools, dies, gages, jigs, fixtures, molds, and special cutting tools, along with standard tools, constitute the keystone of production. The most expensive machine tool cannot operate without its complement of small tools and the $100,000.00 stamping press is useless without its die. Tooling is fundamental; it is the most essential of essential products. Practically no production moves without it.

It follows logically that the men who design, develop and build tooling are "first line men" in the battle of production. They cannot be replaced because the time required for training is not a few months—it is years. And what is more, a tool or die maker becomes a really *good* craftsman only if he has an innate ability for developing mathematically correct "sculptures" in metal.

It is natural that the Selective Service should want to know about training in tool rooms, die and mold shops. It is safe to say that every tool and die shop, every tool room has in training today as many men, who have the required aptitudes and mathematical education, as its management can find. Not every applicant for such training can be used but when one has the "makings" he becomes valuable very soon. This is because die and jig and fixture building is often done by groups. The most experienced man is the leader and the others rank according to ability and experience. Thus the trainee is almost immediately a "gear in the train" although the least important. But remove him after one year and the only alternative is to start another and wait a year.

Because practically every die and special tool is individual, different from the one which preceded it, the trainee does not learn by repetition like in parts production. Therefore, tool and die makers, even those with years of experience, are always on the alert for improving their procedures. Descriptive and educational material is eagerly sought by them and many of them attend night classes which make "essential" even those qualified to instruct and write on tooling techniques.

★ ★ ★

Manpower is again, or shall we say still, the topic of the day. The Washington Letter which we wrote for our October, 1942 issue and have reprinted here in its entirety is just as timely now, and exactly as pertinent to the situation as it was then. Industry is again trying to retain "necessary" men, this time the last of the 26 year old, and younger, experienced tool makers, die makers and precision machine operators. In the eighteen months since we wrote that letter many tool and die makers of varying experience have been inducted into the Armed Services.

Today Selective Service Boards apparently have an order to induct every man of twenty-six years or less who is not employed in one of about a dozen industries defined by the War Manpower Commission as engaged in critically essential production. Among these are several which Commission officials must realize are directly dependent upon precision tooling either to initiate production of new war items or maintain production already begun. It is estimated by the National Tool and Die Manufacturers' Association that the number of such skilled men in contract tool and die shops who would be affected by this induction order is inconsiderable compared with the aggregate number in that age group, probably not more than 20,000. The addition of this number of men to our Armed Forces would seem negligible, while its subtraction from this industry could be disastrous.

Ninety-four Chicago tool and die shops assert that 22% of their workers are 26 years old and under; 55% are under 37. In Detroit the circumstances are similar. It is unfortunate that the members of this vital industry with its fundamental function of designing and building precision tooling for all industries could not have realized the value of early, organized, cooperative effort directed toward more effective publicizing of these vital industry statistics. It is difficult also to understand how in the face of the testimony of the Army and the Navy that war materiel needed for invasion of enemy lands cannot be produced without the tooling which is being built in many of these shops, there still is doubt as to the greater value of keeping these skilled craftsmen at their machines and benches rather than having them serve in the Army or the Navy where their respective skills usually cannot be utilized to the same advantage.

Twice recently, owners and operators of tool and die shops have appeared before the important Senate Military Affairs Committee and the Draft Deferment Subcommittee of the House Military Affairs Committee. They have testified that the demand for tools and dies now is at the highest level since the war began and that they are being forced to decline many orders for tooling required for essential military production.

The list of "necessary" men set up by the War Manpower Committee eighteen months ago was headed by die makers, and tool makers were in fourth place. The demand for tools and dies being not only as large but even larger today, there would seem to be no other logical course open than for the War Production Board to investigate the urgency of every request for deferment of a tool, die, gage or mold maker, and if justified, to recommend such deferment to the War Manpower Commission and the Selective Service System.

Editor

PRODUCTION PROBLEMS

IN SMALL PARTS MANUFACTURE • PART 2

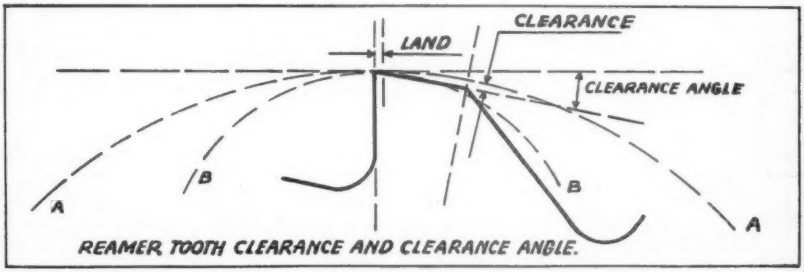
by C. P. Roberts, M. E.
and
E. B. Neil, M. E.

In Part 1 some of the general requirements of small parts manufacture and a number of specific problems were discussed, these dealing largely with threading (tapping) operations. Each problem was based upon a specific case, and the method discussed as a solution was the one actually used. The following three cases also are based upon experiences in producing parts of small size, but may well be pertinent to the production of much larger parts.

Improving the Finish by Improving the Reamer

Startling differences in the quality of finish obtained from reamers, which apparently were the same, led to a detailed analysis of reamer design, followed by numerous tests to disclose causes of these differences.

In studying reamer design, i. e., the contour of the cutting edges and associated angles comprising its geometric form, a point which should be obvious is that a reamer must have one form for one material and a different cutting angle for another material, since a reamer's cutting action is basically the same as that of other cutting tools used for turning or milling. Another consideration is that since a reamer is cutting an "inside" surface, the geometrical condition under which the reamer tooth meets the metal is not the same as if the cutting action were on an "out-



REAMER TOOTH CLEARANCE AND CLEARANCE ANGLE.

For a given reamer size, the clearance angle is a result of the width of the land and the actual clearance as shown for a hole represented by the peripheral line A—A. The width of the land will not vary greatly from the accepted optimum of 1/64" regardless of reamer size. To maintain the desired clearance behind the cutting edge, it is readily seen that in the instance of a smaller hole, represented by the peripheral line B—B, the clearance angle as measured from a line tangent to the circle (hole) at point of contact (cutting edge) must be increased.

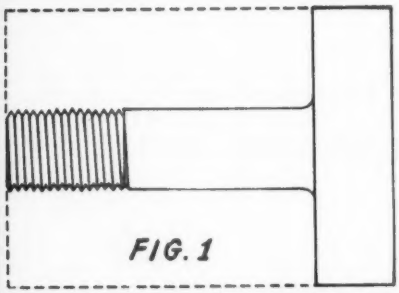


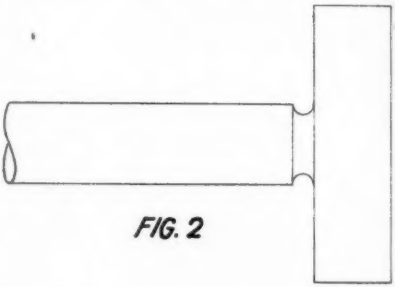
Fig. 1 — A part whose original design called for turning it from solid bar stock. In the revised design, the shank was turned from small bar stock and the "head" from larger bar. The shank was inserted in a bore through the head and "peened" in place.

side" surface. Thus the design angles of reamers must differ from those of "outside" cutting tools in order that the effective or "metal working" angles and/or clearances shall result in correct cutting action. Reamers must therefore be ground to suit the material and, basically, the clearance angle for a reamer of one size would be different from that for another. This is shown in the accompanying sketch of reamer tooth clearance and clearance angle. In small parts the effects of small differences in angles aggravate the difficulty of obtaining a smooth cutting action.

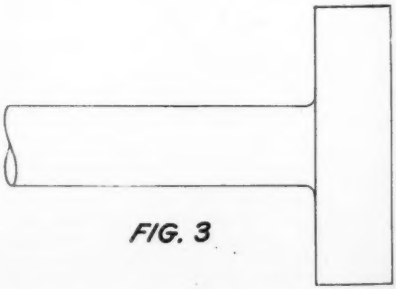
Much has been studied and published about the galling or "welding" effect in metal cutting operations, and it was found that this was also a factor in reamer cutting action. When reamers were ground in the usual manner, and even when great care was exerted to prevent it, the cutting edges were "burned" or heated to a more ductile condition than the remainder of the material. The edges would "build-up" with the metal being cut and produce minute rough spots which spoiled the finish. On carbon or high speed steel reamers this difficulty was overcome initially by hand stoning the edges. Honing was also satisfactory.

Where greater production per reamer is desired, two additional means are available, namely, the use of chromium plated reamers and reamers tipped with cemented carbide. Since the tendency of metals to gall is retarded in proportion to their hardness and low ductility at high temperatures, both chromium plating and carbide tipping reduce the welding "affinity" of the reamer for the metal being cut. But even with tools of this type precautions are necessary if smooth cutting action is to be obtained.

Smooth surfaces are essential, not only where they intersect to form the cutting edges but in the flutes as well. Smooth surfaces mean that the wedge-like, metal parting action of the cutting tooth encounters less resistance; resistance to chip flow is also lessened thereby expediting chip removal; and due to the over-all improved cutting action, less heat is generated and consequently there is less tendency toward a "built-up" edge. Furthermore, with



Figs. 2, 3—In the design of parts which are to be finished by grinding, a relief should be provided where a diameter meets a shoulder in order to allow the grinding wheel to clear without contacting the shoulder or face. This is correctly shown by Fig. 2 as compared to the design of Fig. 3 which is to be avoided.



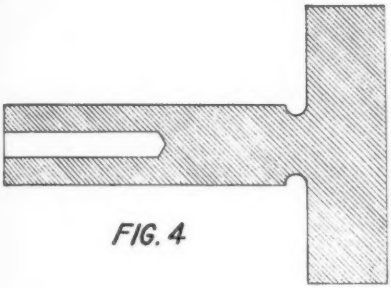


FIG. 4

Figs. 4, 5 — The specifying and drawing of holes should be given most careful consideration. Only when the assembly or operation of components demands it should a hole be specified with a flat bottom as in Fig. 5. Such holes require extra operations and are needlessly time consuming and expensive. Ordinarily, therefore, a hole should be "drawn-in" as shown in Fig. 4. Showing the angular V form of the drill point is insurance against misunderstanding and wasteful production.

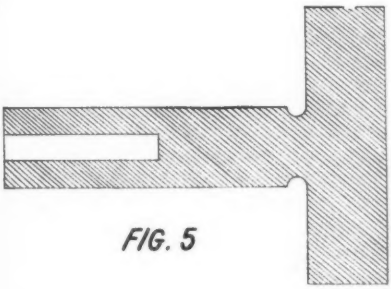


FIG. 5

chrome plated reamers, the under-surfaces must be smooth to assure smoothness of the plate unless additional time is to be spent in regrinding and honing the plated surface. Even so, the thickness of plate is not as uniform as when the under-surface is smooth and there is a greater tendency for the chrome to flake off. The danger of flaking prevails also if the thickness of plate is too great.

Smooth flutes were shown to be of great value in assuring smooth cutting action and fine finish. Grinder marks, and especially cracks between the carbide tips and body of the reamer, were cause of rough finish, due to the greater tendency of the chips to bind or clog as they are parted from the metal.

Out of the foregoing analysis and tests, the following "rules" for reamer use were set up:

(1) Reamers must be ground to suit the material, using different angles for different sizes.

(2) On carbon and high speed steel reamers, the surfaces must be smooth and free from any "smear" metal.

(3) Carbide tipped and chromium plated reamers must also have smooth cutting edges.

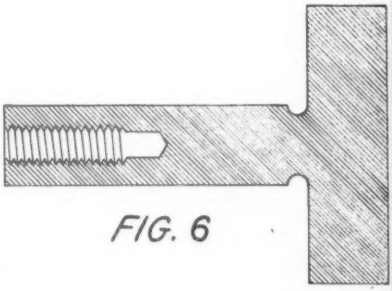


FIG. 6

Figs. 6, 7 — Relative to the drawing of threaded holes, if the designer needlessly shows the hole as in Fig. 7, the production department will have to set up for a hand tapping "bottoming" operation following the preliminary machine tapping. Whereas, if the hole is shown as in Fig. 6, it can be machine tapped only because of the clearance provided for the point of the tap.

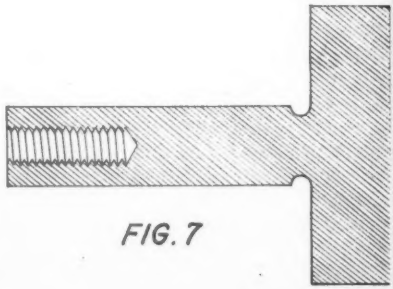


FIG. 7

(4) The flutes must be smooth to prevent chips from binding and clogging.

(5) Carbide tipped reamers must have smooth junctions between tips and body of reamer. Cracks and rough joints will mar the finish.

(6) Chromium plated reamers must have smooth under-surfaces as well as cutting edges.

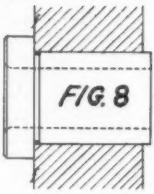
Effect of Smooth Surface Under Plating On Wearing Qualities

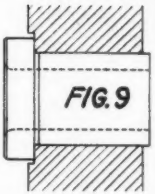
While the effect of smooth under-surfaces on chromium plated reamers has been discussed, the same consideration is a factor in the life of various parts which are chromium plated to resist wear or abrasion. Where undersized parts may be plated to reclaim them, the quality of the underlying surface is of equal importance.

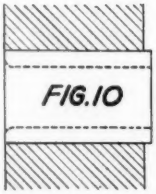
In one instance a ball bearing raceway had to be pressed on and off a shaft several times in the checking of its position and the operation of the mechanism in which it was used. This caused the "smear" metal left from the grinding operation to shear away, with the result that the raceway was below standard tightness when the mechanism was ready for delivery. While a honed surface materially improved the situation, the part was eventually chromium plated. This, in addition to the honing, maintained the fit throughout the several manipulations. In using chromium plating for this purpose, its tendency toward "building up" on sharp edges has to be watched carefully, and it may be necessary to lap the surface to assure the correct diameter throughout. Incidentally, it is this "sharp edge effect" resulting in the formation of needle-like protuberances on cutting edges that may tend to destroy the thread form of precision taps if they are chromium plated to increase their initial life or to bring their size up to standard after they have become worn.

Tips On Redesigning To Permit Faster Production

In Part 1 it was brought out how important the "little things" in design really are in making faster production possible, in fact in making it even possible to manufacture some parts by real production methods. This means the complete elimination of hand or bench operations. That hand operations may still be "necessary" is only because the designer overlooks what ordinarily are "little things" and which often have absolutely no adverse effect upon the quality or strength of the part. The accompanying sketches cover some actual cases where by making simple changes, production was materially stepped up, but only after discussions and delays pending acceptance of the changes.







Figs. 8, 9 and 10—In the selection and specifying of bushings, the experienced designer can effect savings in cost and production time. Figure 8 shows a bushing assembly that calls for the machining of the entire surface in which the bushing is mounted. Figure 9 shows a more economical arrangement for a bushing inasmuch as only an area slightly greater than that of the bushing shoulder has to be machined, a simple counterboring or spot-facing operation. If the application is such that the body of the bushing can be depended upon to provide sufficient thrust area, the bushing design of Fig. 10 should be considered as it requires a minimum of machining.

After too briefly checking for generally accepted standards, i. e., ASA, SAE, A-N, etc., and not finding what he wants, the designer, without investigating further, will often draw in a "dreamed-up" bushing, ferrule, washer or screw. This sometimes occurs even

(TO PAGE 110—PLEASE)

Tool steel tubing applications

by George Bissett
President,
Bissett Steel Company
Cleveland

In World War I, the practice of using tool steel tubing in the manufacture of dies, tools and machine parts had not yet been developed. This commodity and its applications were introduced to American industry by the Bissett Steel Company in 1925. The knowledge of its uses and characteristics has spread slowly and steadily since that time.

During World War II, it has come into much wider use as a result of the pressure upon manufacturers to reduce tooling time and speed war work, yet so far as its general utilization throughout industry is concerned, the surface has hardly been scratched. Thousands of time-, money-, and metal-saving applications remain to be discovered by engineers and shop men in all branches of the metal working industry.

Perhaps the intense competition which may be expected to arise in the approaching post-war period will provide the greatest impetus in the use of tool steel tubing. Short cuts that aim toward getting products on the market ahead of competition will be the order of the day, and tool steel tubing's prime virtue is that it speeds the construction of dies and tools, cutting costs at the same time.

Tool steel tubing is made of non-shrinking, oil-hardening, tool steel which is equal in physical characteristics to other high grade tool steels although it has been proved superior to many tool and die steels for certain kinds of work. Proper heat treatment results in deeper hardness penetration, and, when subjected to severe abrasion it stands up uncommonly well. It is a non-sensitive steel with regard to heat treatment. It can stand a lot of rough handling in the hardening process and has an unusually wide range of temperatures at which it may be hardened without distortion or damaging strain.

Tool steel tubing is made in sizes from 1" to 14" OD, with a wide choice of wall thicknesses to suit a variety of needs. Figure 1 shows the varying wall thicknesses of a representative selection of tubing sections. Smaller sizes (not shown in illustration) are made by piercing and rolling, while the larger ones are extruded. By either process, the metal is so compressed as to give a sound, close, grain structure.

In order to obtain a tubular piece or ring of tool steel without boring or forging it is only necessary to saw off the necessary length of tubing and then machine the piece to the final dimensions and contours required by the job.

Generally speaking, there are three principal types of application for which tool steel tubing is best fitted, i. e.:

Fig. 1—A representative assortment of tool steel tubing sections showing a wide range of wall thicknesses.

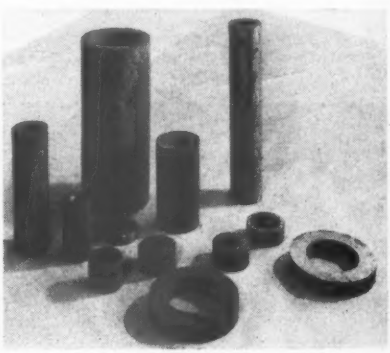


Fig. 2—Trimming die punch ring easily turned from nearest size tool steel tubing.

1. For cutting, blanking and forming tools.

2. For sleeves, bushings, collets, reciprocating parts, etc.

3. For machine parts.

More specifically, it can be used for blanking dies, forming dies, punches, slitters, spacers, skiving knives, collets, collet closers, spindle thrust collars, lead screw thrust collars, bushings, rim rolls; crushing rolls, master tools, ring gages and bearings, to name but a few of the most commonly encountered applications. In the production of any of these items the use of tube stock is more economical in every way than machining from the solid. For example, suppose a tool steel bar 6" in diameter and 12" long is bored out to a 1" wall thickness. The equivalent of a 4" bar becomes scrap, having been bored out of the 6" bar. If the steel costs 40 cents a pound, the waste in material cost alone (estimating the weight of a 4" x 12" bar of tool steel to be 43 pounds) is $17.20. The labor involved would in most cases cost even more, to say nothing of the diversion of time and manpower, and the cost of tool bits, machine maintenance, power, etc.

Fig. 3—Forming die that performs the operation of fastening top of practice mine over body flange.

In Figs. 2, 3 and 4 may be seen an interesting use of tool steel tubing in the construction of dies for the manufacture of practice mines used in army combat training. Figure 2 shows a section of tubing used to form the punch ring in the trimming die for the body of the mine, at the left in Fig. 4.

The two die parts in Fig. 3 are used to fasten the top of the mine over the flange on the body. The punch is shown at the right, the forming die at the left. Each utilizes a ring which has been cut from a tool steel tube and then machined. The cam which fits into the segmented ring of the forming die is necessary to allow clearance for the wire handle on the side of the mine, which is spot welded in place before the top is put on.

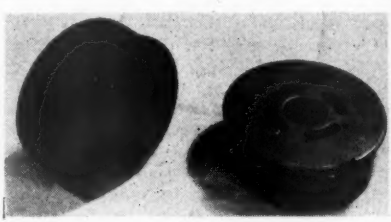


Fig. 4—Cover and body of practice mine used in army combat training.

This creates a problem which might be difficult to solve in a satisfactory manner without tool steel tubing. The segment is cut out of the ring before hardening, leaving a shape which is very likely to distort in the process of heat treatment. Note also the thin section portion of the forming ring; if the steel used is not exactly right, this section may crack in heat treating. Because of the advantageous physical characteristics of tool steel tubing noted above, neither distortion nor cracking took place, and the die has functioned perfectly on many thousands of mines. If

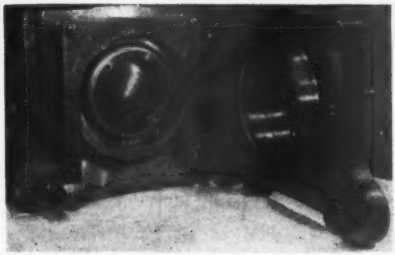


Fig. 5—In this press tool the blanking and drawing rings, pressure pad and draw stake utilize four sizes of tubing.

tubing had not been available for this job, it would have taken considerably longer. Forged rings would require at least a few weeks for delivery. There would be three ways to make the rings out of solid stock: (1) to machine the metal out on a lathe, (2) to saw it out with a band saw, and (3), in the case of the smaller die shop which does not have a band saw capable of the job, to drill a pattern of holes around the inside circumference of the ring in order to remove the center disc. Obviously, these methods would be highly wasteful of metal and labor.

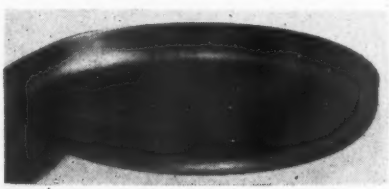


Fig. 6—Heater top produced by tools as those for Fig. 5.

Figure 5 shows a die in which tool steel tubing was employed to maximum advantage by being used for all cutting and forming. This die, designed for the production of the heater top shown in Fig. 6, incorporates four different sizes of tool steel tubing. In the assembly shown at the left, the outside section of tubing is the blanking ring, the middle section is the pressure pad, and the inner section is the draw stake. In the portion of the die shown at the right, one section of tubing was used to make a blanking and drawing ring.

Although it is difficult to obtain exact figures which show the production qualities of a die steel, occasionally a job turns up which demonstrates that tool steel tubing outwears ordinary tool steel in certain applications. For instance, a large manufacturer of abrasives decided that tool cost was high on a job which consisted of stamping out sandpaper discs, and turned to tool steel tubing as a possible solution.

The die shown in Fig. 7 was the result. The punch was made of a 7" section of tubing, cut to length and ground to a 30° shearing edge. In the die, shown at the right, note the simplicity of the arrangement for levelling and the air spaces to free the blanked-out discs.

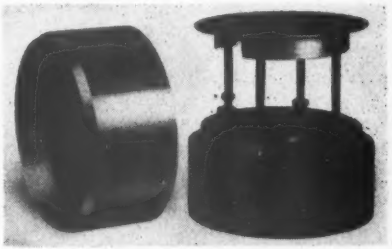


Fig. 7—Punch and die for blanking-out sandpaper discs. Five sets of these tools, mounted in one press for simultaneous operation, blanked 128,000 discs before needing resharpening.

Five of these punch and die units were mounted on a high-speed single-action press operating at the rate of ten strokes per minute and a production rate of 50 discs per minute was maintained. A total of 128,000 discs was made before it was necessary to regrind the cutting edge, doubling all records of previous tools. Thus, although the chief item of cost under consideration had been the frequent regrinding of the cutting edge, three major advantages were effected by the changeover: (1) the initial cost of making the dies was greatly reduced because tubing eliminated much machining, (2) the frequency of regrinding was cut in half, and (3) production was stepped up sufficiently to show a substantial reduction in the cost per finished disc. The saving involved is not always so great as in this particular case, however, but it is always well worth consideration. In the construction of the several dies under consideration, the saving is estimated to be

Fig. 8 — Circular slitting tool made from ring of tool steel tubing. The available combinations of tubing ODs, IDs and wall thicknesses simplify the making of such tools with accompanying savings in machine hours and metals.

from 30 to 70% of the material cost.

A somewhat different cutting tool is shown in Fig. 8. This is a slitter blade, made by sawing off a thin ring of tool steel tubing and machining a cutting edge to the proper angle. This tool may be used on metal or other materials, and may be used on an arbor with several other such blades, separated by tool steel tubing spacers.

Figure 9 shows a noteworthy application of tool steel tubing on a somewhat larger scale. These are the crushing rolls in a machine which pulverizes hard and abrasive ceramic materials. They are made from sections of tubing 11″ OD and 6″ ID, with mild steel, shaft supporting, discs welded to the ends. The roll surfaces are hard chrome plated to a depth of .005″ which greatly increases their wearing qualities. It is interesting to note that the end discs are arcwelded into place with monel metal electrodes. This is because ordinary welding rod would pick up too much carbon from the tool steel and the weld would tend to crack. Monel metal's greater ductility lessens this possibility. Another interesting fact is that the rolls were heat treated before the ends were welded to eliminate the possibility of confined oil vapor exploding.

One alternative to making these rolls of tool steel tubing is to make them of steel castings with chilled surfaces. These would be unsatisfactory because the hardened surfaces would be lost in regrinding, whereas the tool steel rolls are hard throughout and may be ground any number of times without lessening their effective hardness.

Ordinary tubing with a carburized surface has been tried for this purpose also, but without marked success. Here again, repeated grinding removes the hardened surface. In the end, the tool steel rolls have proved far less expensive and more satisfactory.

An idea of tool steel tubing's flexibility as a material for making workholding tools may be obtained from Fig. 10, which shows an expansion work holder at the left and a three-piece collet bushing at the right.

The expansion sleeve is tapered inside to fit a tapered arbor, and is slotted around its circumference so that it will symmetrically expand as much as $\frac{1}{32}$″. The bushing, which is used inside a screw machine collet, is made by cutting a ring from a tool steel tube, machining

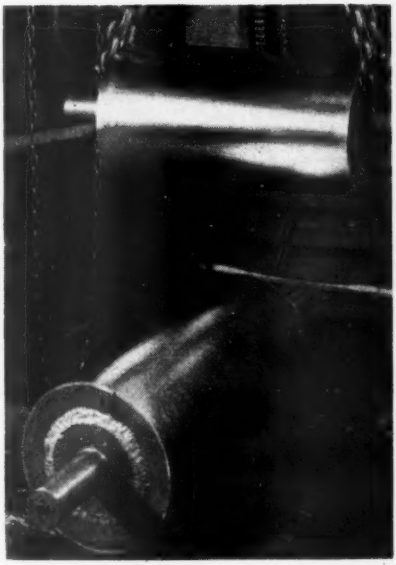


Fig. 9—Tool steel tubing crusher rolls for pulverizing hard and abrasive, ceramic materials.

the shoulder which is visible in the illustration, sawing almost through the ring at three equi-distant points, heat treating the entire part, and then completing the cuts with an abrasive cut-off wheel. This standard technique is

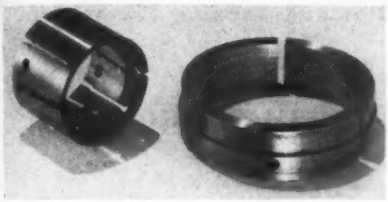
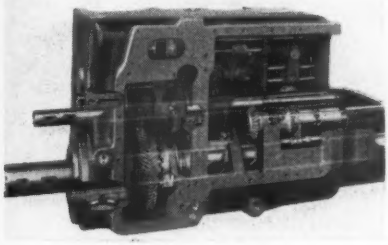


Fig. 10—Tooling accessories fabricated from tool steel tubing. Left, expansion work holder; right, three-piece collet bushing.

followed, rather than cutting the sections entirely apart in the first place, to avoid distortion in hardening. However, when using tool steel tubing, it would be possible to heat treat after severing the pieces, with a resultant minimum of distortion.

The use of tool steel tubing in the manufacture of machinery is not as common as its use for tools and dies, but this is a field which should be further developed. Machines can be improved and their manufacturing cost reduced by the incorporation of tool steel tubing parts. For example, Fig. 11 shows a cut-away view of the headstock of a Giddings and Lewis table-type milling machine. The main spindle sleeve bearing (lower left of illustration) is made of tool steel tubing. In this application,

Fig. 11—Giddings and Lewis table-type milling machine headstock incorporating (lower left) a main spindle sleeve bearing made of tool steel tubing.



the tube section is turned, hardened, and ground to an extremely close fit. The manufacturers advise that it is of great advantage in this instance for they need a high carbon steel for extreme hardness.

New Patents of Tooling Interest

(for obtaining, see page 128)

GAUGE FOR TAPERED PIPE THREAD, No. 2,339,699.
TOOL-MARKING MACHINE, No. 2,339,716.
HONING MACHINE, No. 22,423 (Reissue).
HYDRAULIC WORK HOLDER, No. 2,339,800.
DRILLING APPARATUS, No. 2,339,801.
MACHINE TOOL, No. 2,339,839.
DIVIDING HEAD, No. 2,339,864.
CLAMP, No. 2,339,897.
SHELL DRAWING PRESS, No. 2,339,959.
GRINDER, No. 2,339,961.
CONTROL MEANS FOR ROLL FEEDS, No. 2,339,962.
INDEXING MECHANISM, No. 2,339,986.
PRESS, No. 2,340,009.
HONING TOOL, No. 2,340,018.
DRILL PRESS, No. 2,340,054.
GRINDING MACHINE, No. 2,340,096.
GRINDING APPARATUS, No. 2,340,121.
DRESSING MECHANISMS, No. 2,340,192.
MILLING MACHINE, No. 2,340,210.
CASTING MACHINE, No. 2,340,262.
TOOLHOLDER, No. 2,333,228.
MAGNETIC CHUCK, No. 2,333,230.
TOOL, No. 2,333,233.
SHAVING DIE, No. 2,333,238.
LATHE BED, No. 2,333,250.
METALWORKING MACHINE, No. 2,333,256.
ADAPTOR FOR WORK STOCK, No. 2,333,260.
SANDBLAST NOZZLE, No. 2,333,264.
METHOD OF PRODUCING BAR SECTIONS FROM METAL SCRAP, No. 2,333,271.
PRESSURE FEEDING ATTACHMENT FOR TAPPING MACHINES, No. 2,333,276.
EXPANSION RIVET, No. 2,333,277.
METHOD OF AND APPARATUS FOR STRAIGHTENING STRIP STEEL, No. 2,333,282.
APPARATUS FOR CASTING, No. 2,333,286.
NUT AND METHOD OF MAKING SAME, No. 2,333,290.
METAL SHEARING MACHINE AND THE LIKE, No. 2,333,293.
SURFACE FINISHING MACHINERY, No. 2,333,304.
MEASURING AND DRAFTING INSTRUMENT, No. 2,333,307.
BROACHING MACHINE, No. 2,333,337.
TOOL SLIDE ADJUSTING MEANS, No. 2,333,341.
HEAT TREATING MEANS, No. 2,333,344.
FILING AND JIG SAW MACHINE, No. 2,333,372.
FASTENER DEVICE, No. 2,333,388.
TOOL MOUNTING FOR HAMMERS, No. 2,333,405
GRINDING MACHINE, No. 2,333,411.
DIMPLING APPARATUS, No. 2,333,418.
GAS HAMMER, No. 2,333,419.
DIAMOND ABRASIVE ARTICLE, No. 2,333,429.
THREAD CUTTING DIE, No. 2,333,462.
APPARATUS FOR FORMING BEARING METAL SURFACES ON BACKING METALS, No. 2,333,506.
ABRASIVE BELT GRINDER, No. 2,333,507.
PRESS, No. 2,333,529.
RATCHET CHUCK, No. 2,333,549.
METALWORKING MACHINE, No. 2,333,563.
FURNACE MUFFLE CONSTRUCTION, No. 2,333,579.
DRILLING MACHINE, No. 2,333,589.
VERTICAL INJECTION PRESS, No. 2,333,601.

Service Button of Plastics

What is destined to be the most widely displayed service emblem—the honorable discharge identification button—is a plastics product. It is gold plated and when polished it looks like a silver button. Over one million discharged veterans are now wearing this button; eventually eleven or twelve million of these buttons will be distributed and worn.

DRILLING ANGULARLY RELATED HOLES

Jig Cradles*

DRILL jig cradles are used for positioning a jig when drilling holes at an angle. By using a crade, a jig can be designed for drilling all the holes in a piece of work in one jig, even though some of the holes and their corresponding drill bushings are at various angles from the holes which are drilled when the jig stands on its feet. See Figs. 158, 159 and 160.

C. W. Hinman
Designing Engineer

In Fig. 158 a vertical drill in an ordinary drilling machine can enter the bushing at *A* and drill a hole when the jig is resting on its feet. Hole *B* is drilled after placing the jig in a cradle as seen in Fig. 159, and *C* is drilled in a similar cradle, Fig. 160. It is obvious, under the conditions shown here, that it would be practically impossible to align the bushings in Figs. 159 and 160 in any other way for drilling angular holes on a vertical spindle drilling machine. However, if the angles of the holes to be drilled are considerably *less* than those shown here, there are other methods for drilling such holes without using a cradle, and jigs for them will also be considered.

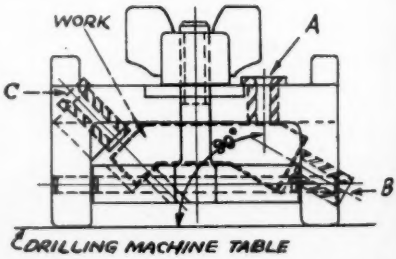
Cradles for small jigs may be machined from one piece of cast iron or machinery steel or they can be built up by welding together pieces of steel. If the cradle is of one piece of machinery steel it can be pack case hardened to ensure long wearing qualities. Cradles for very large jigs are often built up from Masonite or hard wood parts for light weight and mobility. In such instances the supporting surfaces are covered by steel plates to take the wear. A cradle must be made for each angular position of the jig bushings; this is necessary in order to support the jig with its bushings in a vertical position for drilling at each of the several angles. Cradles are used for both drilling and tapping operations. For small jigs with angular drilling, the cradles can be combined in one piece, and not used separately as shown here.

There are many types of cradles. Figure 161 shows one of the low slung type which is simply a V slot milled in a piece of cast iron or steel. The slot is milled in proper relation to the position of the angular bushings in the jig. Low slung cradles are for jigs which are low in height with which angular holes must be drilled quickly.

Drilling Angular Holes Without Cradles

Figure 162 illustrates a type of jig in which hole *D* is drilled at an angle of 10° to the length of the piece. This design of jig avoids using cradles and its success depends upon dimensions *F* and *G* which must be about equal, and height *H* of the jig body, which must be not

Fig. 158—Drill jig resting on its feet in a normal position for drilling hole A.



*Examples of the design, construction and use of cylindrical jigs and suitable supporting cradles for drilling angularly related holes in round work, were given in *Tool & Die Journal*, May, 1942.

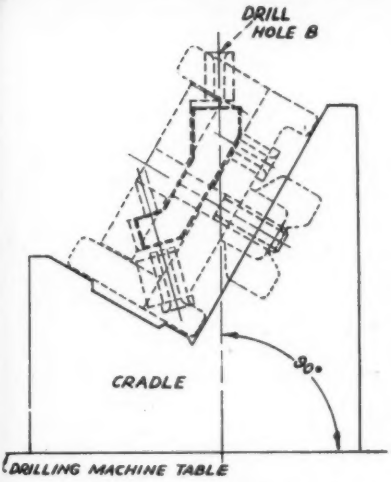


Fig. 159—Drill jig positioned in the cradle for drilling hole B.

much more than twice the sum of *F* plus *G*. Hole *E* is at a different angle than hole *D*, and is drilled when the jig stands on its feet.

Using cradles to tilt the jig for drilling angular holes should be avoided if work output is very high. Cradles can be avoided by incorporating an elevating device in the jig, similar to the one shown at *J* in Fig. 163. This attachment is easy to make but should be installed only in fairly large jigs. It is composed of shaft *K* on which the legs *J* are pinned and which can be revolved and locked. Compression spring *L* locks legs *J* on stop pin *M*, until the legs are unlocked in order to elevate the jig.

In this jig holes can be drilled through bushings *N* when the jig stands on its feet, or at an angle through bushings *M*, after revolving and locking *J*, as illustrated in Fig. 164. By designing lug *J* with more contact feet than the two shown here, a jig can be made that will position the work for holes at several different angles.

Using a cradle for drilling angular holes becomes impractical if the jig and cradle are very large and cumbersome. The cradle always seems to be in the way of the jig when drilling the holes that do not call for it, and moving it around is often a hazard, especially if it is large and heavy. It is good tool engineering to try to eliminate the cradle entirely by incorporating an elevating attachment integral with the jig.

Tooling Conditions For Drilling Angular Holes

1. When work is clamped at the desired angle in a square or rectangular jig.

2. When the work is clamped in a normal position and drilled with the jig positioned in a cradle or by using tilting attachments.

3. By clamping the work in any convenient position in a jig that rests on feet which have the desired angle under the jig and guide bushings.

4. By clamping the work in any convenient position in a jig and drilling the holes through guide bushings that will take angularly positioned drills.

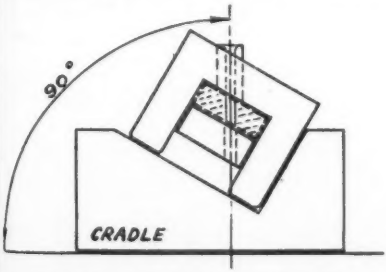


Fig. 161—Low cost jig and cradle.

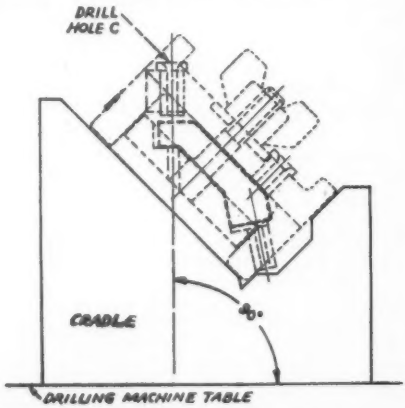


Fig. 160—Drill jig positioned in the cradle for drilling hole C.

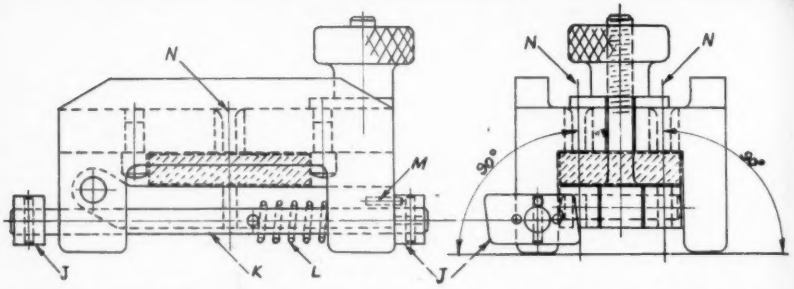


Fig. 163—An adjustable elevating attachment J that permits tilting jig to angular positions, thus avoiding use of two cradles.

Conditions 1 and 4 have been illustrated and described in Figs. 123 and 125 respectively, on pages 95 and 96 in the November 1943 *Tool & Die Journal*. However, condition 4 can be expanded tremendously as has been done in the drilling of engine blocks for automotive and airplane motors. This expansion becomes necessary when the work is required in exceedingly large quantities and the total output is to be so great as to justify the high cost of building special drilling machines with angularly positioned drilling heads.

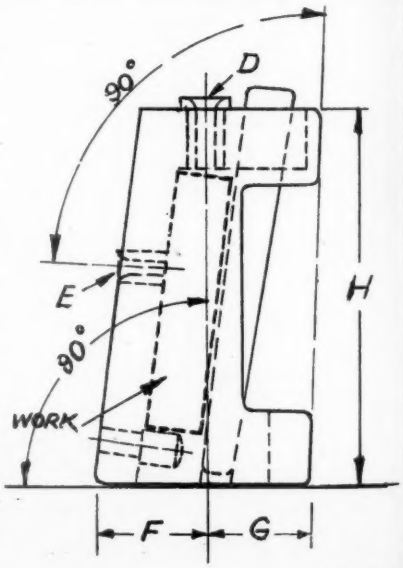
In drilling sewing machine heads, the jig is bolted on the drilling machine frame. The drills revolve in sliding heads which approach and drill the holes through guide bushings and then withdraw. The operations may include drilling from above the jig, from its sides and ends, and sometimes from underneath. Holes are drilled at right angles, or possibly at many other angles to the jig and work.

In some comparatively recent, multipurpose machines for drilling, reaming, tapping, and making light milling cuts, we have a good example of condition 4. The work is secured in a series of jigs attached in a circle on a central table that can be rotated. The drilling heads are located around the jigs at convenient stations, and are placed in positions for drilling either straight or angular holes as the jigs are revolved with the table and stopped and locked at each of the operating stations. This equipment is used in many plants where small accurate parts for guns are being produced in large quantities.

Speeds for Individual Drills in a Group

In any group of high speed steel drills some of the drills may be twice the diameters of others. When they all run at the same speed, and this is the usual condition in multiple drilling machines, if a speed is used that conforms to the specified circumferential travel in feet per minute for the small drills, then the larger drills will wear and become dulled

Fig. 162 — The significant dimensions that govern the design of a jig for drilling angular holes without use of cradle.



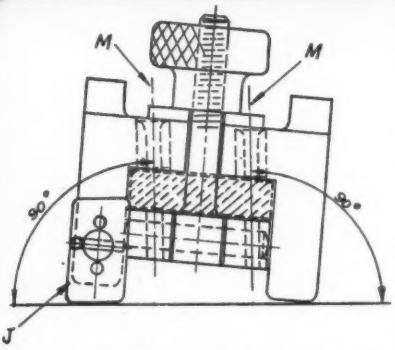


Fig. 164—The jig, shown in Fig. 163, elevated by manipulation of attachment J for drilling angular holes M-M.

quickly because their speed is twice too fast. This condition involves the necessity of removing the large drills for too frequent grindings; it wastes time and expensive critical steel. Two changes can be made to remedy this trouble.

1. Substitute carbon steel drills for the smaller sizes and reduce the rpm of all drills 50 percent.

2. Do not reduce speeds of the smaller drills nor exchange them for high speed steel drills, but use a speed reducer for each of the larger drills.

Obviously, under the first condition, the hourly output of work is reduced, but under the second condition the highest output can be successfully maintained.

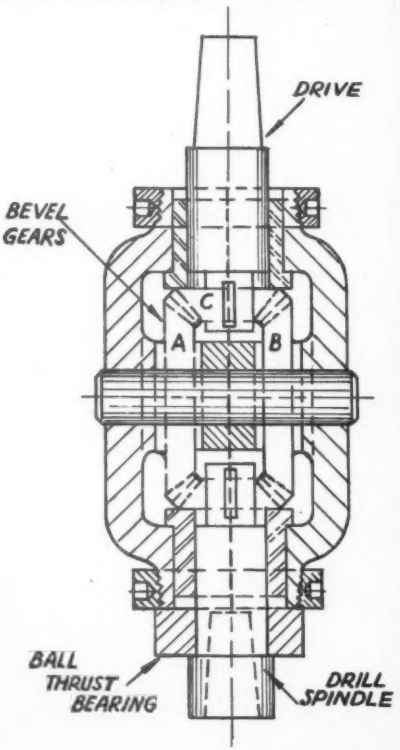
A design for the speed reducer is presented in Fig. 165. The housing is made of two cast iron parts, and the spindles are "bushed" for long wear. The interior of the housing is packed with light grease. A clamp extends from the reducer body to the machine frame to prevent the reducer from revolving with the drill. The number of teeth in bevel gears *A* and *B* are double the number of teeth in driving gear *C;* therefore the rpm of the drill spindle is reduced one half. However, in some multiple spindle drilling machines, speeds of individual spindles can be changed independently.

Multiple Drilling Heads

The plan view in Fig. 166 shows the principle employed in some types of multiple drilling heads. The cover on this head has been removed to expose the driving gear mechanism. In the sketch, vertical shaft *A*, upon which the main spur gear *B* is keyed, revolves in the direction of the arrow, being driven by its tapered shank and tang which is secured in the spindle of a drilling machine. Several pairs of upper and lower adjustable radial arms *C* swing on shaft *A* as a center, and each have elongated adjusting slots that carry the bearings for vertical shafts and different sizes of pinions, *D*, *E*, *F*, and *G*. The pinions run in mesh with gear *B*, and each is keyed on one secondary vertical shaft, which together make up the spindles of the multiple head.

One or more of the radial arms, as at *H*, may carry an idle spindle which is

Fig. 165—Speed reducer permits efficient operation of large drills with a group of smaller drills. The gear driven gear must be of the opposite rotation.



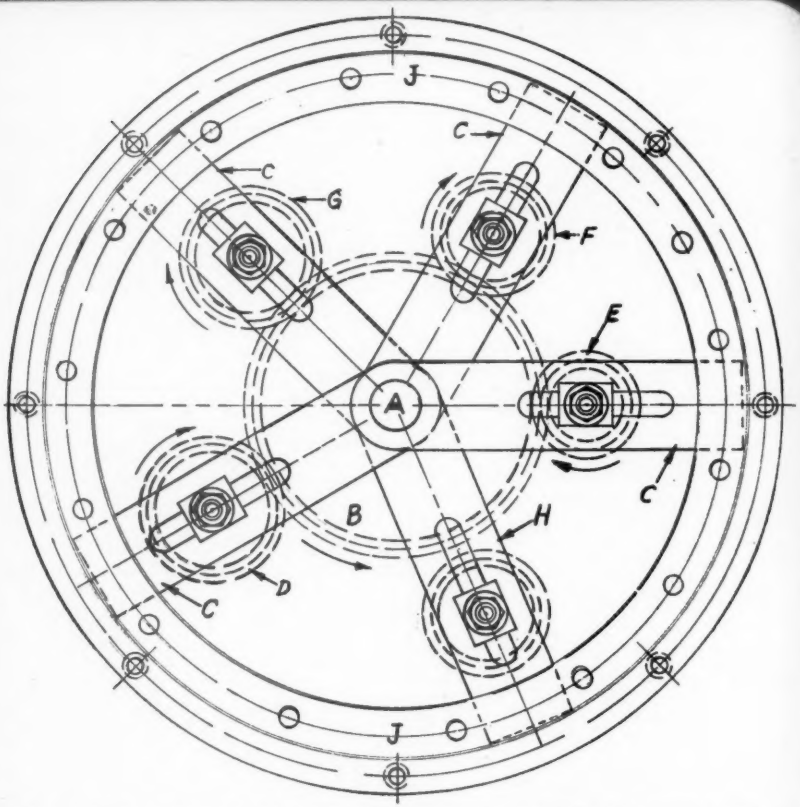


Fig. 166—A multiple drill head gearing arrangement by which central spindle A drives two or more adjustable spindles.

adjusted out of mesh and therefore not in use, but can be brought into action easily when necessary for drilling additional holes. All the radial arms can be rigidly secured in place by inserting clamping screws through ring *J*, around the head, or by other means that permit easy adjustments for securing the arms at different radial positions around a circle.

By the principles used in the design of this head, the four or more vertical spindles can be adjusted in many different positions for drilling holes through bushings in a drill jig at desired center distances. Moreover, by substituting different diameters of pinions, the circumferential travel of the drills in feet per minute can also be controlled to suit various diameters of drills. Driving gear *B* can also be exchanged with a smaller gear which is sometimes necessary to accommodate shorter center distances between the drills.

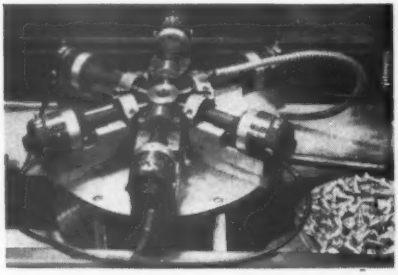
A Supplementary Index—the new feature in this issue (see Page 117) was designed to help readers find shorter editorial items of particular interest.

New Edition of "Plastics Mold Designing"—Gordon B. Thayer's new second edition is more than twice the size of the first edition (see Page 120).

New Zagar Tooling

Bolt Head Drilling Unit

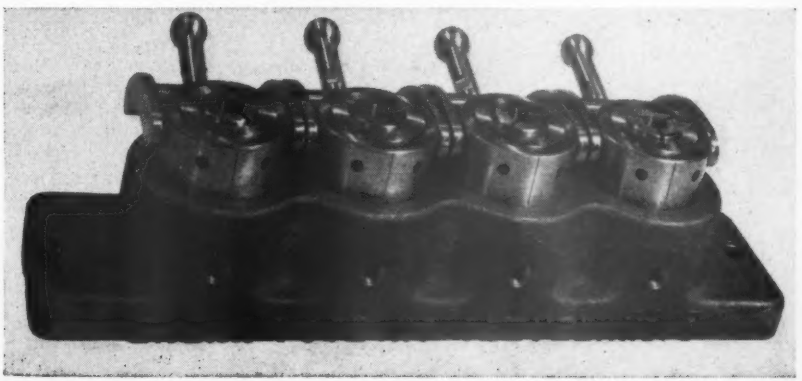
An ingenious, yet simple and practical fixture to drill bolt heads is a recent addition to the line manufactured by Zagar Tool, Inc., 23880 Lakeland Blvd., Cleveland 17, Ohio. The unit consists of six Dumore hand grinders mounted, as shown, on a circular base. Operation of a lever moves the drilling heads into the work and a reverse movement releases the work. In the illustration, six lock wire holes are being drilled simultaneously in an aluminum aircraft pump screw head of ⅝" hex. With the work placed by hand in the holder an average of 300 pieces per hour was reached. To reduce both time and expense, the fixture was made without a floor base or special stand. Another advantage was that the fixture could be placed exactly where it was needed and could be easily moved from one job location to another. In the illustration the fixture is mounted on a regular stock wash tank.



New Multiple Collet Fixture

The multiple collet holding fixture illustrated here is the latest addition to the Zagar line. Its design is in answer to a demand by users of standard Zagar single holding fixtures for a fixture of greater work holding capacity to be used on larger milling machines. It makes possible a great variety of set-ups which boost output at no sacrifice in accuracy. The multiple fixture consists of four Zagar holding fixtures in either the 1" or 2" size. They can be mounted either parallel with or at right angles to the cutter spindle. Two, three or four collets can be used, or mutiples thereof. An indefinite number of multiple fixtures can be used at once, the only limit being the length of the machine table. The center to center distance of the collets is 3½" on the 1" fixtures and 5½" on the 2" fixtures. The fixtures can be staggered, however, which reduces the projected or effective center to center distances to 1¾" and 2¾" respectively. Where the miller is equipped for climb-cutting, two fixtures can be mounted on each side, making a total of sixteen collets on one set-up. The fixtures have all the advantages of the well known Zagar Holding Chuck. The design is extremely simple, facilitating use by relatively unskilled operators. There is nothing to get out of order and the rugged construction insures long and trouble-free service.

The danger of chip congestion is lessened by directing the coolant flow upward thus rapidly washing the chips away. 650.5-J



Modern Messengers in

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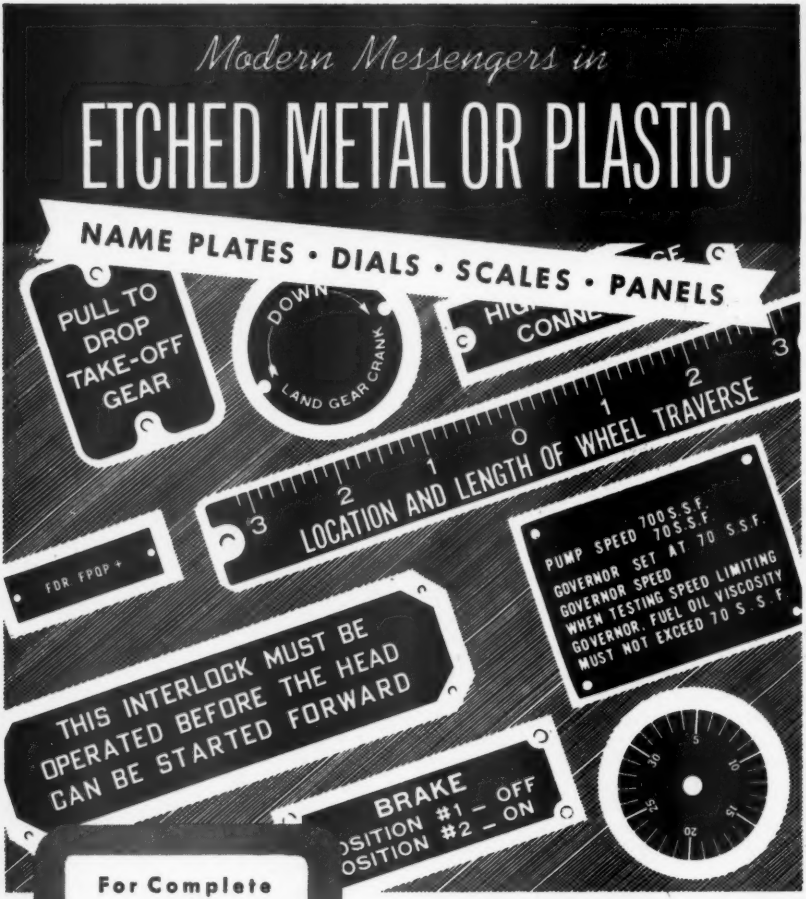
NAME PLATES • DIALS • SCALES • PANELS
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DOWN
LAND GEAR CRANK
LOCATION AND LENGTH OF WHEEL TRAVERSE
PUMP SPEED 700 S.S.F.
GOVERNOR SET AT 70 S.S.F.
GOVERNOR SPEED
WHEN TESTING SPEED LIMITING
GOVERNOR, FUEL OIL VISCOSITY
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INDUSTRIAL PLASTICS

Procedures in Plastics

THERMOSETTING MATERIALS

by Warren V. Prince

There are approximately twenty main types of plastics materials available at present. Of these, five types are thermosetting. It is important that the outstanding characteristics and applications of each type be clearly understood. This knowledge is essential to the product designer, the mold designer and builder, the molder or fabricator and the service user.

The characteristics and differences between materials will be referred to again when each plastics material is treated in detail. They will be an important consideration in discussions on parts design, mold design, plant equipment, molding and fabricating techniques and in cost estimating.

The five types of thermosetting materials are:

(1) phenolic resins, which are available for use in three groups
  (a) molded phenolics
  (b) laminated phenolics
  (c) cast phenolics
(2) phenol furfural resins
(3) urea resins
(4) melamine resins
(5) cold molding (refractory) compounds

Each type of material is available in many different formulations; various fillers or other ingredients being used to control physical and molding properties.

These plastics, as with the thermoplastic materials to follow, will be discussed from both their applications as first choice materials as well as substitute materials. The use of plastics as substitute materials, especially in temporarily replacing critical metals, is relatively important at present. However, the future and normal developments of applications will probably be toward a greatly widened and intensified use of plastics as first choice materials. The use of plastics as first choice materials will be given particular attention.

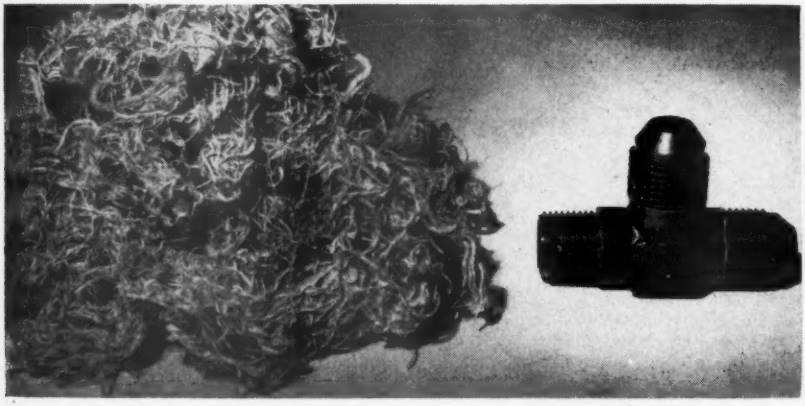
All molding compounds of the thermosetting materials are prepared by the materials manufacturers in powder form ready for molding. These powders vary in appearance according to their fillers. Some fillers, such as wood flour, are fine and of flour-like consistency, which makes the molding powders look something like a fine sugar, except for color. Other fillers, such as macerated fabric, are chopped up pieces of linen, canvas, etc., which may approximate the size of a quarter. In this case the molding materials take on the appearance of the macerated fabric, the fabric pieces being stiffened somewhat due to their impregnation with the plastic resin. When molded, the resin acts as the bonding means for the filler in holding the mass together as a hard substance. Such rag-filled materials are called impact materials because of their excellent impact or shock resistance properties.

Fillers provide a great variety of properties with the thermosetting materials, particularly with the phenolics.

Materials can be made to suit almost any molding requirement. Some of these classes available are:

(1) General purpose
(2) Impact resisting
(3) Heat resisting
(4) High dielectric
(5) Acid and alkali resisting
(6) Low power factor
(7) Moisture resisting
(8) Wear resisting

Laminated plastics have a tremendous place in the plastics industry and especially during the war. The reasons are as follows: Thermosetting materials as a class are hard. This is an asset for most applications. Yet, they are at the same time a little too brittle as molding compounds for many technical applications. Laminated thermosetting mate-



• *Photo courtesy The Weatherhead Co.*

A high impact, string filled resin impregnated phenolic material exactly as shown at the left was molded into the aircraft T-fitting shown at the right. Nothing has been added to the material in molding. The bulk factor is 12-15 to 1.

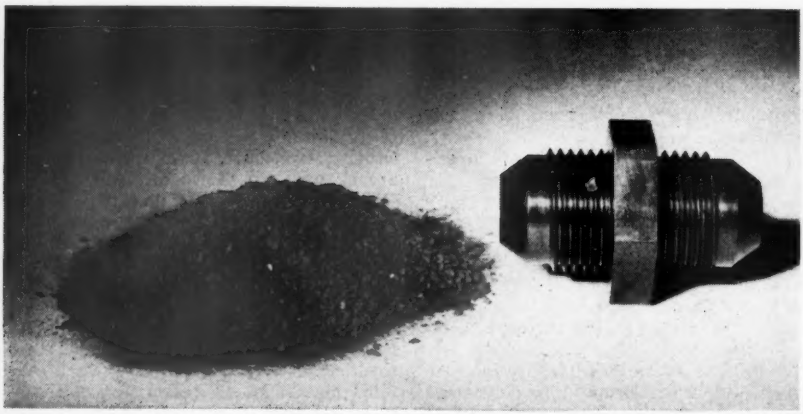


Photo courtesy The Weatherhead Co.

The quantity of general purpose, woodflour fill phenolic material as shown at the left was molded into the aircraft nipple fitting shown at the right. The bulk factor of general purpose woodflour phenolics ranges from 2.2-3 to 1.

rials make it possible to maintain all of the natural hardness of the resins, yet remove practically all brittleness of the material, thus making it both hard and tough with the highest shock resistance possible with any plastics material.

Laminated plastics are made by taking sheets of cotton fabric, paper, asbestos cloth, glass fabric, wood, or any other woven or absorbent sheet material and impregnating or soaking them with plastic resin and drying. The impregnated sheets are then stacked and cured or hardened under heat and pressure to the desired shape. After that they are trimmed and machined as desired.

Phenolic molding compounds are the most widely used of the thermosetting materials. Chemically they are referred to as phenol-formaldehyde resins.

The molded and laminated phenolics are available only in browns and blacks from the standpoint of stock materials. Cast phenolics are available in all colors.

Molded Phenolics

The molded phenolics are used mostly for their excellent dimensional stability as a plastic, for their high mechanical strength, low cost of material, good insulating properties both electrically and for heat, and they are capable of being molded to a good lustre. They have an advantage of being available in a variety of physical properties as a result of the use of various fillers.

The public in general is more familiar with these hard and usually black molded phenolic parts than with any other plastics material. Among the most common trade names for these are: "Bakelite", "Durez", "Makalot", "Resinox" and "Textolite." The uses are extremely common. Some of their uses are:

Ammunition fuze bodies
Shell caps, plugs and booster tubes
Aircraft parts
Camera and clock cases
Automatic pencils
Radio cabinets
Bottle caps
Pump housings and parts
Hand wheels and valves
Desk accessories
Handles for electric irons, pans, etc.
Telephone hand sets
Electrical plugs, sockets, junction boxes, etc.
Instrument housings
Optical equipment

Laminated Phenolics

The laminated phenolics are most

Lightness in weight and attractive appearance are advantages of these pieces molded of phenolic resins. They give an idea of the range of applications for commercial use.

Photo courtesy Durite Plastics, Inc.

widely used in the technical market. They may be purchased from the material manufacturers either as impregnated sheeting ready for laminating or as laminated cured sheets or blocks ready for stamping or machining to the desired shapes, such as name plates, paneling, gears, bearings, etc. The uncured sheeting can be cut and placed into molds for the molding of such articles as food trays, army helmets and helmet liners, special shapes having uniform thickness, etc., or they can be laminated between flat platens for making table tops, bar tops, gear blanks, etc.

Laminated tubing in a wide range of sizes is obtained by wrapping uncured sheeting around a mandrel and cured by baking, after which the outside is ground smooth and the tubing cut to length. Laminated tubing is sometimes molded to obtain specific characteristics. Rods are turned out of sheet stock. Both tubing and rods may be ground to close tolerances.

Airplane propellers are made by laminating layers of resin impregnated wood and machining to size and proper balance.

The surfaces of laminates can be cured to a bright finish. The surfaces in contact with polished plates during laminating take on the same high lustre of the plates such as in the case of laminated table tops. Machined surfaces of laminated parts are dull due to cutting into the cloth fibers.

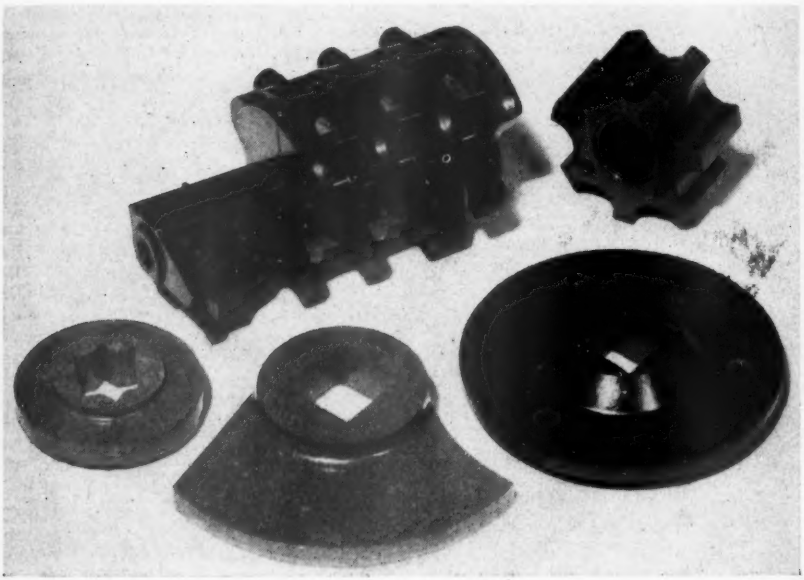
Among the most common trade names for laminated phenolics are: "Formica", "Micarta", "Insurok," "Lamicoid" and "Synthane."

Cast Phenolics

Cast phenolics are furnished by the materials manufacturers as liquid resins which are of the consistency of thick honey. These resins are not molded or laminated and contain no fillers. They are poured into molds, which are usually lead molds or glass molds, and placed into an oven at about 170° F for several hours for curing. Physical strength of cast phenolics is lower than in molded compounds because of not being cured under pressure and because they contain no fillers. They have excellent lustre

Phenolics are among the most versatile of plastics for industrial use as illustrated by this variety of cams and gear blanks.

Photo courtesy General Electric Plastics Div.



and very good machinability. They may be buffed and polished to a high lustre after machining, which is an advantage, if no filler.

Cast phenolics are used extensively for brightly colored ornamental applications, coat hangers, plastics jewelry, etc. Some of the common trade names are "Catalin", "Bakelite", "Opalon", "Marblette", and "Genstone".

Phenol Furfural Resins

The furfural plastics are so much like the molded phenol formaldehyde that they are almost impossible to distinguish after molding. Even their physical characteristics are very similar and are used for much the same applications, especially in the technical market.

These are the plastics that come from cellulose scrap from the farms. Corn cobs and stalks, rice, oat and cotton seed hulls—formerly waste—are utilized. The Quaker Oats Company has done the pioneer work in extracting furfural, or bran oil, from their cellulose scrap.

The molding properties of the furfurals are only slightly different from the phenol formaldehyde in that they tend to remain softened longer during molding before they set up. Sometimes this may be to advantage in that they can fill out certain cavities easier than can the phenol formaldehyde, because they do not tend to harden during filling.

Photo courtesy Durite Plastics, Inc.

Phenol furfural and phenol formaldehyde resins are used as a bonding agent for abrasive particles by many abrasive wheel manufacturers.

Furfurals only come in dark colors due to the tendency to discolor or darken during processing. However, the furfurals are very stable in molding and are free from scorching or blistering at normal mold temperatures.

The most common trade name is "Durite". This furfural is used widely for abrasive wheel manufacture to furnish a bond for the abrasive particles.

Urea Resins

The chemical name for urea plastics is urea formaldehyde. The urea molding compounds produce pieces with a hard surface and combine the properties of translucency, lightfastness, surface lustre and polish. They compare favorably with the phenolics in nearly all applications. They have almost a full color range; they are the only thermosetting molding compounds and laminated materials that are available in the lighter colors.

The finish on urea resins has the unusual property of improving in lustre through handling rather than becoming dull. This accounts for their wide use as decorative handles, cosmetic articles, table tops of lighter colors, etc.

The material cost is nearly double that of the phenolics. The molding properties are practically identical with the phenolics, except that the molding temperatures and the curing time are a little more critical. The ureas are a little harder and more brittle than the phenolics and a little more sensitive to moisture absorption. Ureas are molded in the same types of molds standard in molding phenolics. In some cases the same molds can be used for both materials.

Some other uses are for lightfast shades, dishes and tumblers, electrical applications, bonding of plywood, laminated food trays, water proofing of textiles, etc. The most common trade names are "Beetle" and "Plaskon".

Melamine Resins

Melamine formaldehyde molding compounds are the newest of the thermosetting materials. These are the hard-

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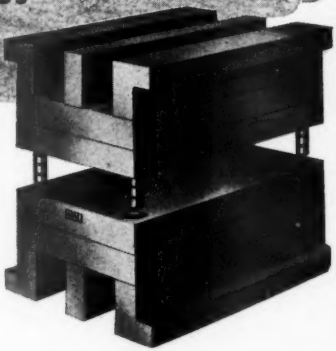

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est thermosetting resins and are particularly useful when laminated because the brittleness is removed.

Outstanding uses are in the electrical field due to their low moisture absorption and excellent dielectric strength together with good dimensional stability. They are resistant to higher temperatures than the other plastics. The general appearance is about the same as urea formaldehyde. The molding compounds are handled and molded much the same as the phenolic compounds, except that they require a somewhat longer molding cycle.

Other melamine resins are used for coatings, adhesives for plywoods, and as binders, especially in insulating and in abrasive compositions.

Photo courtesy General Electric Plastics Div.

The ureas, being available in all colors, particularly in the lighter shades, hard, translucent and giving excellent light diffusion, are widely used for indirect lighting lamp reflectors.

The common trade names are "Melmac", "Plaskon", and "Catalin."

Cold Molded Compounds (refractory)

Cold molded compounds present a fourth method of fabrication of the thermosetting plastics. They are formed to shape in a cold steel mold and are then hardened by a curing operation in an oven after removal from the mold.

There are two types of cold molded compounds. One is a thermoplastic material of organic composition and is non-refractory or softens with heat. The other type is a thermosetting material of inorganic origin and is refractory or infusible with heat.

The outstanding property of the refractory compounds is the unusual resistance to high temperatures. It is even flame resisting. The heat resistance is as high as 1300° F before any effect is noticed. Cold molded compounds are in a class by themselves in this respect. For this reason they are used widely for heat resisting applications, particularly in the electrical field. A common household example is with heater connectors for electric irons, etc.

Other valuable properties are chemical resistance, hardness, and wear resistance.

The refractory cold molded compounds use fillers of asbestos or diatomaceous earth and contain binders of pitch, asphalt, linseed oil and sometimes synthetic resins.

The next article will briefly survey the thermoplastic materials in much the same manner as has been done here with the thermosetting materials.

Plastics Materials Manufacturers Extend Activities

The Plastics Materials Manufacturers have appointed F. H. Carman as general manager of the Association and have established quarters in The Tower Building, Washington, D. C. Mr. Carman was associated with the WPB from April, 1941, through December, 1943, where he was responsible for allocations of all synthetic rubbers and vinyl polymers. Previously, Mr. Carman was associated with the Armstrong Cork Company and the B. F. Goodrich Co.

A technical committee composed of C. J. Romieux, chairman, Clinton Blount and S. E. Palmer announced expanded activities for the year including presentation of specification information to government agencies, continued cooperation with ASTM and other organizations interested in properties of materials and improvements of the manual "Technical Data on Plastic Materials".

James L. Rodgers of the Plaskon Company is president of the Association; William Thiele of the Catalin Corporation is vice-president and John E. Walker is secretary-treasurer.

Production Problems in Small Parts Manufacture

(CONTINUED FROM PAGE 90)

as to drill bushings although great varieties of standard sizes have long been established and available as stock items. The result is a special size or shape with additional production time required for turning it out. Often by calling in the representative of the maker of similar or standard parts, it will be found that it could have been just as easy to "draw in" a bushing, for instance, exactly the same or differing only in a minute way from the one originally put on the drawing. The difference may be such that the desired bushing can be made from the one selected or recommended, thus saving hours of time in the shop, as well as reducing costs.

Even where the part selected is standard, other standard parts may be more readily available. One of the accompanying sketches covers an actual case where by selecting the simplest of three standard bushings the design was simplified and an additional machining operation eliminated.

Examples of gages and cutting tools chromium plated for greater wear resistance and longer life. In all cases the under-surfaces should be of a high quality finish in order to insure a good bond for the plate. Sharp edges and corners should be given a final hone or lap in order to eliminate the chrome "feathers" that tend to build up during the plating process.

Polystyrene and Butyrate Uses to Increase

In a report made public by the Society of the Plastics Industry, Charles Lichtenberg, assistant general manager of synthetic resins sales for the Monsanto Chemical Company, states that the increased availablity of polystyrene would likely result in its growth as a standard general purpose injection molding material. Already the lowest cost thermoplastic injection molding material, polystyrene is due for a further drop in cost when the styrene, now in demand for high octane aviation gas and synthetic rubber, is made available.

Butyrate, the cellulose acetate compound characterized by excellent molding properties, including toughness and dimensional stability, is likewise due for increased use, according to the report. The production of cellulose nitrate is likely due for "a long-term decline" and the vinyl molding compounds, if they can compete in price, will find increasing molding applications.

NASC Approves Plastics Fitting Shapes

The National Aircraft Standards Committee has approved 37 basic plastics fitting shapes for the aircraft industry. Joints, fittings and tubing of plastics have been so satisfactory, that the Committee is preparing specifications for tubing and installation. Plastics are 50% lighter and cheaper than metal fittings and their production rates have enabled manufacturers to get parts as needed. This field offers a definite possibility for postwar plastics parts manufacture since the price range and prime materials tend to broaden the range of applications and avoid, rather than compete, with metal.

New DuPont Plastics Material

Polyethylene, a new material with outstanding electrical properties, good molding and machining characteristics and produced by a range of manufacturing methods, has been developed by E. I. du Pont de Nemours & Co., Inc. Polyethylene can be made flexible or rigid and possesses very high moisture resistance. It has proven particularly well adapted to electrical insulator elements, tubes and containers.

NEW BAILEY CONTOUR CONTROL

FEATURES INGENUITY AND ACCURACY

A new profiling control, which embodies the principle of pneumatic gaging to obtain extremely accurate control of automatic machining operations, has been developed by The Bailey Meter Company of Cleveland, Ohio. A sensitive pneumatic system "scans" a master templet and actuates hydraulic cylinders which accurately and coordinately feed either the cutting tool or the work.

The Bailey Contour Control was originally developed for use in the company's own production which involves the making of flow meter parts of intricate shapes which must accurately conform to specially calibrated masters. Such infinitely varying profiles as parabolas may be repetitively reproduced to an accuracy of within .0002. When both the cutting tool and the templet have been properly ground and honed, the device has held lathe work to a surface smoothness of 60 micro inches as measured by the Brush surface analyzer. These operations which formerly required the highest skills of experienced machinists are now being performed automatically. When the first models were built for this service several years ago, Bailey engineers drew on the experience gained in over 20 years of development of control systems for steam boilers and industrial processes. Several of the original models have been in operation for over three years continuously producing precision parts.

The extreme accuracy of the Bailey method results from using the air control system both as an amplifier of mechanical motion and as the source of power or "linkage," for transmitting the movement of the tracer stylus to the

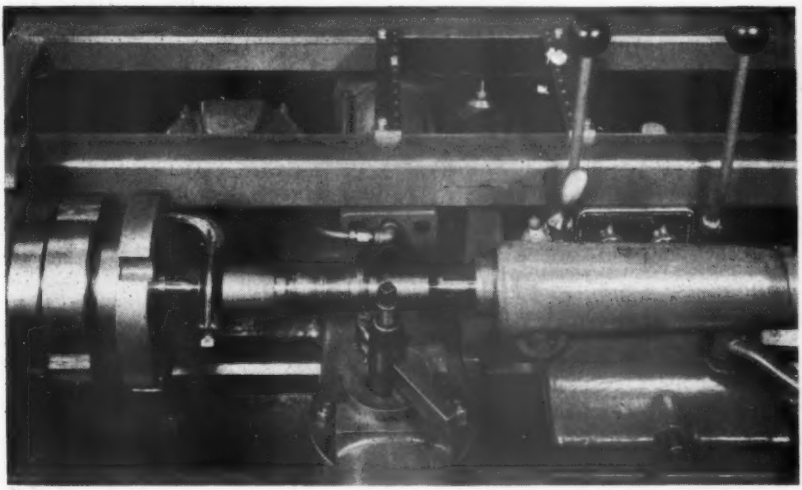


Fig. 1 — Bailey Contour Control installation on a Hendey lathe, as appearing from operator's viewpoint, and showing relative positioning of master templet, pneumatic tracer stylus, workpiece and lathe tool. The master templet is held in a frame which is rigidly secured to the lathe bed and accurately aligned with the ways. The pneumatic tracer stylus assembly incorporates an arm by which it is secured to the lathe cross slide. In order that the profile of the work be an exact replica of the templet profile the radius of the tracer stylus must be the same as the radius of the turning tool at a point of tangency with a line parallel to the work axis.

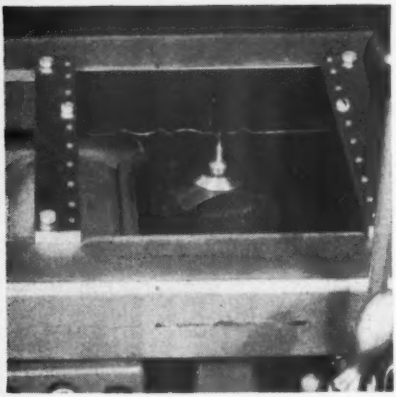


Fig. 2 — Close-up of pneumatic tracer stylus in contact with master templet which is located in frame secured to lathe bed. The frame and its templet locating surfaces are in accurate parallel alignment with the lathe ways.

hydraulic controls. The accuracy and sensitivity of the system can best be appreciated by the realization that there is no direct mechanical (or electro-mechanical) drive between the tracer which follows the master templet and the cutting tool. The tracer point constitutes one end of a lever, and, in the case of a lathe installation, altho the fulcrum of the lever is supported by the lathe carriage, the other, or controlling, end of the lever "bears on air" only. The function of the tracer lever is simply to variably obstruct an air flow. A varying back pressure is thus created that is extremely sensitive to and faithfully reproduces variations in the tracer position as the tracer point traverses the templet. This is the same principle used by pneumatic precision measuring gages, the functional difference being that the air flow is regulated by tracer stylus position rather than by the size of the piece being measured. In both cases, minute changes or differences in the rate of air flow are the work controlling or measuring means.

In the accompanying schematic diagram the Bailey Contour Control is shown as applied to an engine lathe for automatically actuating both the cross slide and the carriage. Air is supplied to the system from a constant pressure source through an orifice of the proper size to maintain the loading pressure of 35 lb psi when the tracer is in a neutral position. This air loading pressure controls both the contour pilot valve and the feed pilot valve. The control power unit consists of a large oil reservoir, a motor driven oil pump, hydraulic pilot valves for the contouring and feed travels of the tool, and directional flow selector valves which provide for turning, boring or facing set-ups.

Referring to the schematic diagram it will readily be seen that as the spring loaded tracer lever follows the templet, changes in contour tend to increase or decrease the air loading pressure in the air control system by changing the rate of flow (leakage) from the air pilot nozzle. The air loading pressure is applied to the air chambers which are expansible by virtue of flexible metal bellows. The air chambers expand against springs until equilibrium is reached between the force of the springs and the force of the air pressure within the chambers. The bellows "breathe" during *changes* in air pressure but always become balanced in a position corresponding to the prevailing air loading pressure.

Consider, first, the Contour Pilot Valve. Since the oil pilot valve stem is attached to the free end of the air chamber bellows, it also moves up and down with changes in air pressure and is, at any one instant, in a position corresponding to the air loading pressure. Assume that at the time the control is placed in operation the cutting tool is not in contact with the work, hence the flow from the air pilot nozzle would be decreased by the tracer lever and the air loading pressure would increase above its neutral value of 35 lb. The contour pilot valve of the hydraulic system would move upward thus permitting the rear portion of the cross cylinder to drain. Hydraulic pressure in the front portion of the cylinder would move the piston backward carrying the cross slide, tool, and tracer lever inward. This movement brings the tracer stylus into contact with the templet, increases the flow of air from the air pilot nozzle, and when the air loading pressure reaches its neutral value of 35 lb, the cross slide movement stops. At the neutral air loading pressure of 35 lb, the contour pilot valve has returned to its neutral position, as shown in the diagram, and has locked the cross slide in a fixed position by ap-

plying hydraulic pressure equally to both sides of the power piston.

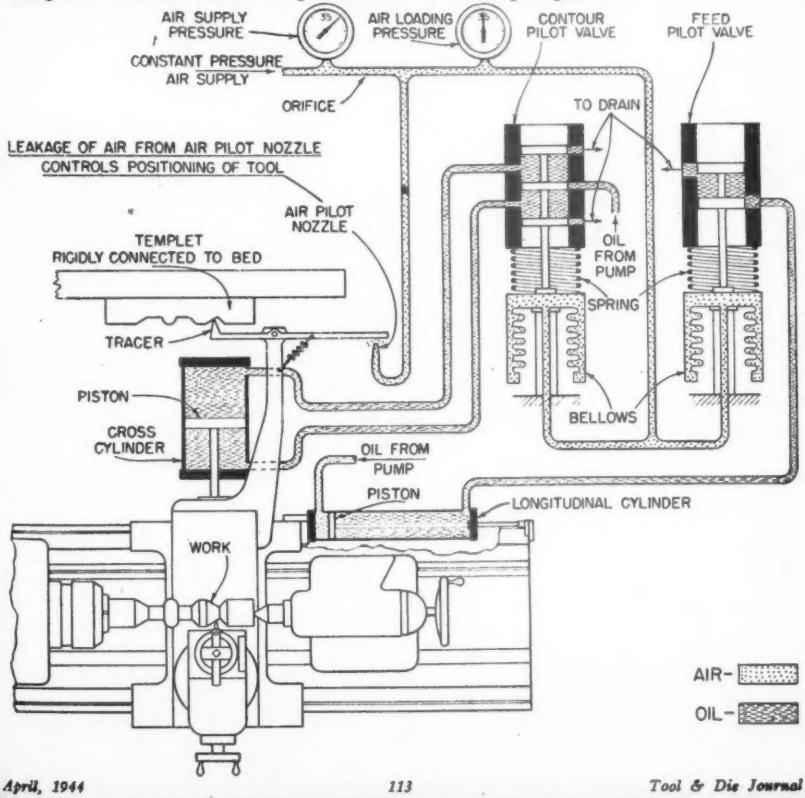
In actual operation the air loading pressure does not vary appreciably from the 35 lb neutral since any tendency to depart from this pressure causes almost instantaneous movement of the cross slide (and tracer lever) in the direction required to restore the neutral pressure.

The rate of longitudinal feed is controlled by the feed pilot valve which in effect throttles the oil drain from the longitudinal power cylinder also in accordance with changes in air loading pressure. The maximum rate of drain from the cylinder and consequently the maximum rate of feed occur when the air loading pressure is held at the 35 lb neutral. Either an increase or decrease in air loading pressure from that value decreases the rate of feed. In fact, if the deviation from the neutral air loading pressure is sufficient, longitudinal feed is stopped altogether. This condition prevails during a facing cut.

Operation of both the feed pilot valve and the contour pilot valve in this manner from the same air loading pressure results in a self-compensating rate of feed. For example, the feed slows down or ceases when cutting a taper or a square shoulder.

Since the Bailey Contour Control functions by the regulation of fluid flows in both the pneumatic and the hydraulic systems, there is no backlash or lost

Fig. 3 — Schematic diagram of Bailey Contour Control pneumatic and hydraulic systems. As the tracer point follows the templet profile, the spring loaded tracer arm varies the leakage of air from the air pilot nozzle and throws the system out of balance. The sensitiveness and positiveness of the system in instantly restoring equilibrium so coordinately governs the tool feed and cross feed as to result in a work profile that is a faithful reproduction of the templet profile.



motion on either side of the neutral tracer position. Furthermore, the air loading pressure which transmits the requirements for tool positioning is a precise indication of the accuracy with which the cut is progressing. This information is made available to the operator by means of an indicating gage in the air loading pressure system. As long as this gage shows the neutral loading pressure to be 35 lb psi, the operator knows that the cutting tool is positioned with extreme accuracy in relation to the master templet. If the air loading pressure increases to 37 lb or decreases to 33 lb he knows that the tool is no longer in the position of extreme accuracy, but that an error of .001 has been introduced. By use of this precise and continuous visual sizing method, or "flying mike effect", the operator can increase his rate of feed up to the allowed tolerance simply by watching the indicating gage on the air loading pressure. Convenient adjustments for both the rate of feed and the rate of contouring action are provided so that a maximum rate of production consistent with the required accuracy may be maintained at all times.

While the possibilities of applying the Bailey Contour Control to various machine tools are of great variety, its use at the present time is being limited to lathes and vertical boring mills. The accompanying illustrations cover its installation on a 12" Hendey lathe.

The photos show a sturdy templet support rack which is rigidly fastened to the lathe bed; a pneumatic tracer held by a rigid arm securely attached to the lathe cross slide; cross and longitudinal power cylinders, both attached to the lathe carriage; hand controls within easy reach of the operator's right hand; a control power unit which rides back and forth on a monorail track with the movement of the lathe carriage, and the air filters and pressure reducing valves which control the supply of compressed air to the pneumatic tracer mechanism. The monorail track is supported by brackets attached to the lathe pedestals so that the equipment causes no floor obstruction.

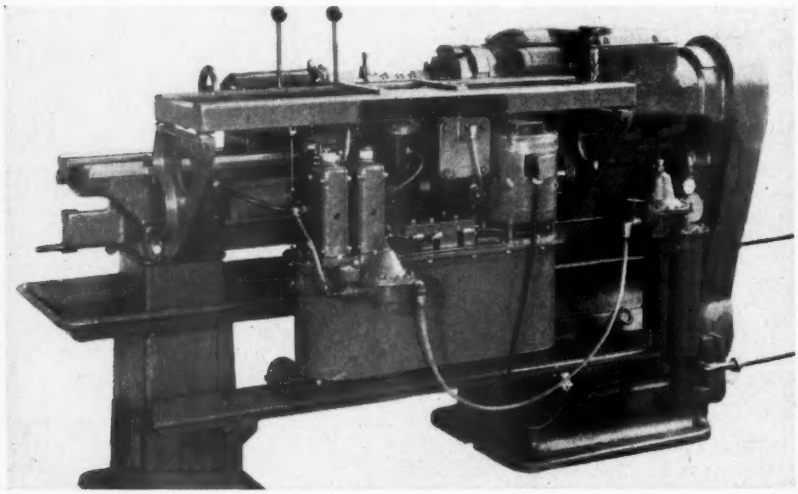
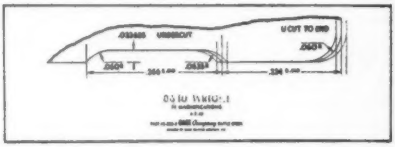


Fig. 4 — Power control system of Bailey Contour Control as installed on a Hendey lathe. Power unit travels back and forth on monorail track with movement of lathe carriage. The monorail track is supported by brackets attached to the lathe pedestal so that the control makes no floor obstruction which would hinder sweepers. The control power unit consists of a large oil reservoir, a motor driven oil pump, hydraulic pilot valves for feed and contouring action, and directional flow selector valves which provide for setting up the machine to turn, bore or face.

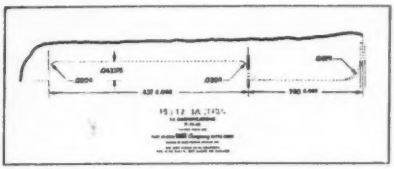
GAGE RADII AND PROFILE CHARTS

a T&DJ

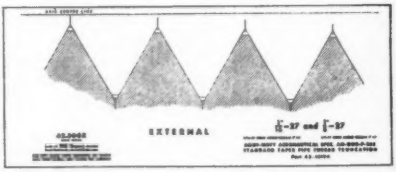
Picture Story

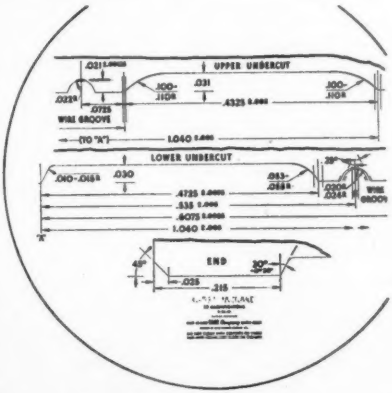


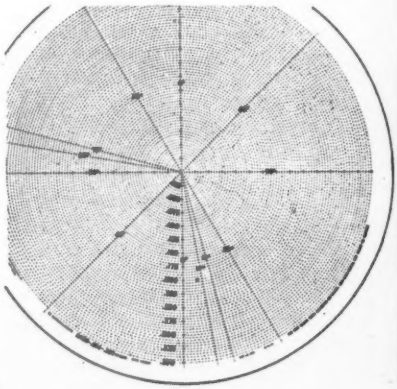
A variety of master charts for checking angles, radii, vertical, horizontal and tangential lines to .0001 for comparative measurement purposes have been developed by the Gage Company of Battle Creek, Mich. Produced from a



master pattern which is frequently more than six hundred times the size of the object to be checked, error is correspondingly so reduced that the finished chart can function as a master gaging means as accurate as a mechanical gage and much easier to manipulate and read. Tolerance lines as related to the work contour are similarly treated, resulting in a projection screen chart of sufficient accuracy to employ for tool checking or "high production" final inspection. Lines on a hand drawn chart are too coarse for accurately locating a shadow's edge, .010 to .020 being the practical limit of an inked line, hence they defeat the accuracy of which the optical comparator is capable. By the Gage Co. method lines are produced that are sensitive to work piece variations as fine as .0001 and by the use of interrupted contour lines this degree of accuracy is readily obtained. The charts are prepared on a heavy and stable plastics base, free of warp or distortion, and produce a sharply defined projected shadow. Gage charts will withstand hard shop usages. 951-J







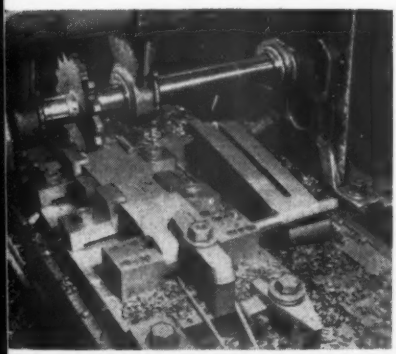
Negative Angle Milling Requires Power and "Know-How"

The focus of attention on negative angle milling, neglected for years, has been brought to the metal working industry forcibly by the aircraft industry on the West Coast. More than two years ago the engineers of Kearney and Trecker began serious experiments with negative angle milling. There was interest in a number of war plants but the western aircraft shops, unimpeded by tradition, were most insistent in accelerating metal removal. Negative angle milling posed two problems—plenty of power and the new technique of carbide milling of steel with negative angles.

A big, rugged, milling machine with plenty of power was built in the Kearney and Trecker shops more than a year ago. Designed and specially engineered to do carbide steel milling, the machine was put to work on all the negative milling jobs that could be found for it. The results were so outstanding that this machine is the newest addition to the Kearney and Trecker line.

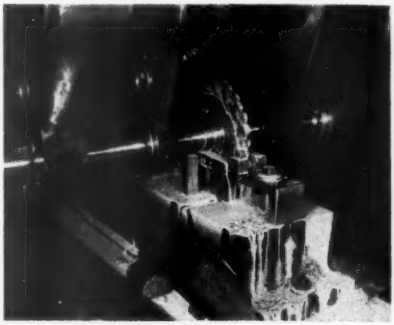
Designated as the CSM (Carbide Steel Milling) Milwaukee, this 50 hp mill, expressly designed for negative angle milling, is an all purpose machine, its extreme ruggedness giving ample power for all negative angle milling jobs and a large reserve for handling regular milling jobs to perfection.

An actual plane part production job will illustrate the new technique. An airplane wing hinge with a .505" slot 10½" long—an interrupted cut—was



milled with high speed cutters at a rate of ½" per minute. It was necessary to mill this slot by feeding the knee vertically with the work going into an 8" cutter leaving a tie at the end of the slot. A finishing pass removed the tie and milled the slot to finish size.

Utilizing carbide milling with negative angles—15° negative rake, 0° helix—this same slot is now finish milled in one pass with an 8" cutter at the rate of



13½" per minute. The hinge has a hardness of 42 Rockwell C. The slot is held within .0005 for parallelism and to .001 for width in 10½", the length of the hinge. The finish is superior to that of high speed steel and obtained without the use of a coolant. The results obtained on this job are typical of the advantages inherent in negative angle milling.

This job was done on a standard bed type machine with motor capacity increased 100 percent and a fly wheel mounted on the arbor. Carbide milling of steel with negative angles requires ample power, fly wheel effect, extreme rigidity and the "know-how" to do good milling.

The new CSM Milwaukee is available in both horizontal and vertical models. Outstanding features include impact eliminating fly wheel, spindle speeds from 50 to 1250 rpm in geometrical progression, electric spindle brake and spindle reverse, thirty-two feeds in geometrical progression from ¼" to 60". Both standard and extra equipment is available to insure the widest use of the CSM Milwaukee both on negative angle and regular milling work. 592-J

Association Gathers Statistics for Excess Profits Tax Relief

A bulletin on Excess Profits Tax relief under Section 722 C has just been released by the National Tool & Die Manufacturers Association to all of its members and a considerable number of non-members in addition. The bulletin informs contract tool and die shop operators that an earlier incomplete check strongly indicates that the Industry's base period, 1936-39, may not represent as advantageous a period as the Excess Profits Tax Law permits an industry to have.

It is desirable, therefore, that a broader survey be made and to that end a new survey form has been prepared and mailed. It is so arranged that the reporting company need not disclose its identity.

That this is an important subject for tool and die shop owners and officials to consider is evident from the inquiries received by the Association from Internal Revenue Department local offices.

Companies whose names have not been included in the survey but who are willing to assist by submitting their tax records with the idea that they may be entitled to relief will undoubtedly be welcomed by the Association. Address National Tool & Die Manufacturers Association, Southern Building, Washington, D. C.

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Cold Rolling Eliminates Rejections

Ira Santy, a machine operator at General Electric's Pittsfield Works, served his apprenticeship in a locomotive shop some years ago. This fact, and a good memory, permitted him to make a suggestion on the finishing of a 2500 pound generator rotor on which there had been

a number of rejections due to excessive runout.

The journal had been ground when other diameters of the shaft were ground. Santy recalled a job from his days as an apprentice that presented a similar problem. It had been solved by rolling. His suggestion was approved and he devised a simple rolling tool for the job.

The illustration shows Santy setting up his rolling tool for the job. The pressure of the hardened roller of the tool resulted in a denser and consequently smoother surface than could be obtained by grinding. The journal was rolled in the same lathe in which it was turned. Since the shaft was kept on the same centers for both operations, it was easier to hold all diameters concentric. Runout was kept within .0002, the specified tolerance.

Progress in Reconversion

Chairman Donald Nelson of the WPB has invited eight to ten prominent civilians to serve on a new advisory committee within WPB to advise the government on the return to civilian production. One critical problem that probably will get early attention is the character and extent of tooling up to be allowed production plants that have either reached peak production of war goods or have capacity available by reason of cutbacks or contract terminations. For example, there is no question but that the present unused capacity in the machine tool industry could be used to excellent advantage for tooling production and manufacturing plants for the postwar market without any interference with the peak war effort. Most manufacturers know now what equipment they will need for reconversion.

The volume of orders that could be placed immediately or shortly would serve the double purpose of keeping the highly skilled machine tool builder organizations intact and allow the manufacturers to equip for reconversion logically and smoothly. Experts in both the machine tool industry and the production industries believe that such a plan would go far to reduce the dislocation of entire industries and react most favorably to limit the volume and period of unemployment incident to reconversion.

The testimony of leaders of the tooling industry before recent Congressional Military Affairs Committees is that the tool and die industry now has the largest volume of contracts in its history. This is significant in view of the fact that most war industries are now fully tooled and is an indication of progress that many high production plants have already made in their reconversion plans.

Correction, Please!

In the table of weights of various materials in Mr. Prince's first article (Page 97, February issue) the average weights per cubic inch of oak and pine were listed as .26 lb and .16 lb respectively. This is incorrect as several readers have pointed out. Since water at 62° F weighs .0361 lb per cubic inch this would deny wood its power to float. The correct figures, differentiating between the principal commercial varieties of each wood are:

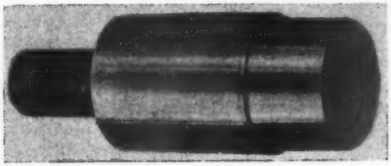
Oak (live)	= .042 lb per cubic inch
Oak (red)	= .027 lb per cubic inch
Oak (white)	= .029 lb per cubic inch
Pine (white)	= .018 lb per cubic inch
Pine (yellow)	= .023 lb per cubic inch

We ask readers who are following this series to make the corrections. We appreciate the interest shown by our readers in calling these errors to our attention.

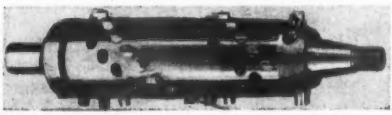
Reaming Tapered Holes in Line Shaft Flanges

a T&DJ Picture Story

A "powered fixture" for the line reaming of tapered holes in drive shaft flanges has been developed by the Tool Engineering Division of Joshua Hendy Iron Works, 206 Sansome, San Francisco, Cal., under the supervision of George Bowman, chief of the division. The unit has three basic parts: (1) four



cast iron cradles or pedestals upon which to align the two shafts to be connected; (2) the fixture proper incorporating the reamer spindle, motor and geared drive; and (3) a set of reamers. The unit locates over the coupling flanges in initial alignment with one of the rough drilled holes by inserting a locating plug in a hole next to the one to be reamed. Excess stock is first removed from the rough drilled holes by means of a "porcupine" tool having spirally spaced cutters. The semi-finish reamer then follows to remove stock to within .010" or .012", after which the finish or sizing reamer completes the hole to .001" or less. The shafts are then rotated and



the machine located for the second hole. These operations are repeated with the fitted bolts being inserted in each hole as finished. The semi-finish reamer is designed with seven flutes and the finishing reamer has eleven flutes. The flutes have an advance of one or two degrees in order to avoid the chatter inherent in reamers with evenly spaced teeth. Note that the locating plug is a "stepped" plug, the smaller diameter being necessary in order to first locate the fixture from a rough drilled hole. Subsequent

locations are made from finished holes, hence the larger plug diameter. Hendy Portable Line Reamers are "tooled" with special saddles and reamers for each job and are in successful operation in several plants and shipyards. 748-J

"Post-War Planning Now"

One of the most comprehensive surveys of vital peacetime plans and projects—a total of 286 in 56 major industries—has just been published as "Post-War Planning Now" by the New York Journal of Commerce. The actual peacetime outlook, descriptive details of new products, services and processes; and the formula for a gradual lifting of price, ration and priority controls are for the first time compiled in one place, according to the publisher.

All the material for this second edition of "Post-War Planning Now" was obtained from data furnished by key industrialists, government and trade association officials. The publication warns that considerable spadework remains to be done in planning and setting up machinery for the orderly disposition of surplus plants and materials and for a sound administration of contract termination and transition controls.

The booklet is jam-packed with valuable information. In transportation, for example, data digested from Detroit states that automobile makers are set to resume production within four months after cessation of war goods manufacture; that a total of 18,400,000 new cars and trucks will be needed to get the nation back to pre-war standards; and that 60,000,000 cars are expected to be on the roads within 10 to 20 years. Aviation executives agree on a family plane costing approximately $2,000 but disagree on air transport and potential passenger volume—the estimates range from 1000 to 9000 transport planes to carry from 10,000,000 to 20,000,000 air passengers annually. Railway travel, according to rail officials, will thrive on a reduced fare and low-cost sleeper coaches.

Plastics, synthetic rubber, electronics, dehydrated foods and other industries developed under war pressure definitely expect to play a major role in post-war business. New outlets for expanded aluminum and steel production are seen as assured. New uses for natural fibers are expected to combat synthetic fibers of chemical, mineral, soybean and other origins. Foreign trade potentialities are expected to be good, with heavy tooling, foods, drugs and textiles profiting most.

Copies of "Post-War Planning Now" may be obtained at 25 cents each from the New York Journal of Commerce, 63 Park Row, New York 15, N. Y.

"Plastics Mold Designing"

The new, enlarged second edition of Gordon B. Thayer's book is in an advanced stage of preparation. It is expected to be ready for distribution shortly after May 1st.

The new edition will contain more than twice the number of pages of the first edition. A total of 20 chapters with many more designs and types of molds, more than 80 drawings and photographs and an enlarged Nomenclature of Plastics Molding strengthens this book's position as the leader in its field.

Many of the drawings are complete schematic elevations or cross sections, or both, of a mold and the principal parts are fully identified for careful study. A new feature is the section on finishing methods and equipment.

The widely quoted and used Nomenclature section has been enlarged to include more terms that have come into use since the first edition was published more than three years ago.

The index is larger with more detailed cross references making the book easier to use. In addition to much new material prepared by Mr. Thayer, several specialists in the field have also made contributions. These include C. H. Whitlock, Don F. Hoffman, Thomas J. Lester, William J. Dewar and the English authority, F. G. Woodiwiss.

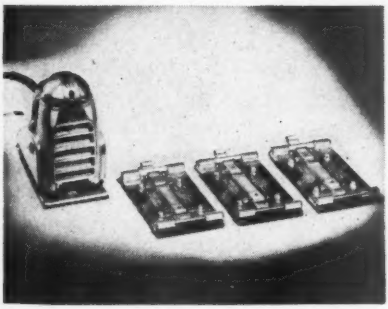
The manner of presentation is clear and concise—the general principles involved are always easy to follow and the details follow established nomenclature closely, making the book equally valuable for the mold shop and for the student.

Other new features include loading the inspection mold, direct and indirect ejector systems for injection molds, an injection mold for a plastics lens, finger core pulls in mold design, molding screw threads in plastics and a very complete section on practical points in mold design and construction.

The new edition of "Plastics Mold Designing" sells at $3.00 per copy plus postage and is published by the American Industrial Publishers, 320 Fairmount-Cedar Bldg., Cleveland 6, Ohio.

PROGRESS ON PARADE

PORTABLE SANDER. Designed to cover the entire range of abrading, from coarse sanding to lapping and finishing, the new Sterling 1000 Electric Portable Sander provides fast, precise and uniform cutting on wood, metal and plastic. This sander is equipped with a flexible sanding pad which will conform to convex or concave surfaces of moderate curvature and which detaches from the machine by simply pulling a latch. When different grades of abrasives are used



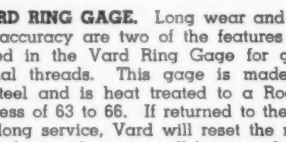
on a job, additional pads fitted with coarse and fine grits can be interchanged. The tumbler action lock on the Sterling sanding pad can be easily operated by a key furnished with the machine. As the lock is turned it draws in the slack thus pulling abrasive taut on pad. Write the STERLING TOOL PRODUCTS CO., Dept. TF, 358 E. Ohio St., Chicago 11, Ill., for complete information. **916-J**

MOSLO EXTRUSION PRESS. The Moslo Machinery Co., Cleveland, Ohio, has recently announced a machine designed to aid laboratory and experimental work in a wide range of extrusion processes. It is a com-

bination of a laboratory type 12-ton hydraulic extrusion press and an automatic wire feed unit. A wide range of speed is offered and pressure of 10,000 pounds per square inch on the material is achieved; this, combined with the automatic wire feeding, makes it suitable for small scale production of welding electrodes. The extrusion die head is

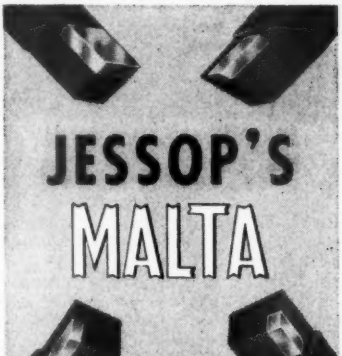
designed at a 45° angle which, it is claimed, minimizes deflection in the wire guide because the flux is forced in a direction more in line with the wire guide. The press is available with dies for extruding powdered metals, carbon and certain plastics and can be had without the wire feeding unit. Details may be obtained on request. **689-J**

VARD RING GAGE. Long wear and maximum accuracy are two of the features incorporated in the Vard Ring Gage for gaging external threads. This gage is made from tool steel and is heat treated to a Rockwell hardness of 63 to 66. If returned to the plant after long service, Vard will reset the master gage; if worn the gage will be reconditioned, then set and sealed. The Number 10 and



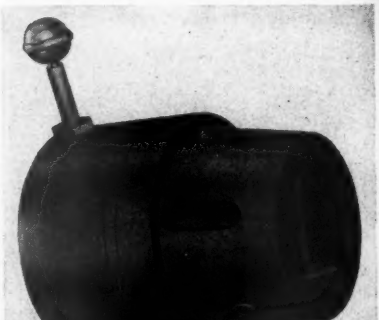
larger Vard Ring Gages have the first thread completely removed to prevent chipping. Vard Thread Precision Ring Gages are made in sizes from Number 6 up to 12" diameter and are ground in National Fine, National Coarse, National Extra Fine, Metric, Whitworth and in other standard thread forms. For further information, write to VARD, INC., 2965 E. Colorado Blvd., Pasadena 8, Calif. **509-J**

MALTA CARBIDE TIPPED TOOLS. A new line of cemented carbides for cutting steel, cast iron, non-ferrous and non-metallic materials has been announced by JESSOP STEEL CO., Washington, Pa. Malta Carbide Tipped Tools, as these are called, are produced to round out the Jessop service to the metal working industry. They are manufactured in ten different styles in a wide range of sizes and three grades of tips: MF for miscellaneous finishing, SF for steel finishing and



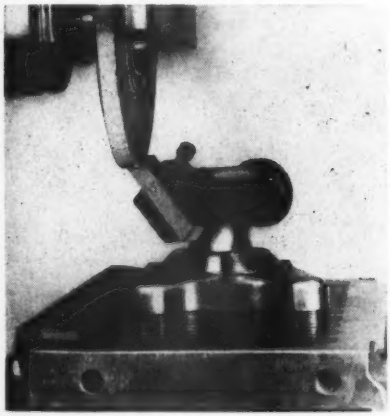
CR for coarse roughing. Each of these is distinguished by colored shank ends; red, white and blue, respectively. This insures proper grade selection. The tools are rust proofed to permit long storage safely. More information about this "J.C." series will be sent by the company on request. **259-J**

THE HUFFORD PNEUMATIC JAW, for holding the workpiece during stretch forming operation on the Hufford Bending and Beveling Machine, has been designed to overcome the problems usually encountered in this work. This jaw is comprised essentially of a double-acting integral air valve, piston assembly, housing, collar and hardened steel jaw inserts. The integral air valve eliminates need



for separate valving and operates off the regular plant air supply. The air pressure against the back of the piston causes the tapered jaw inserts to thrust forward on the tapered faces of the housing and grip the work solidly while it is being formed. When forming is complete, the reverse stroke of the piston causes the inserts to expand on the tapered faces of the collar and permits ready release of the work. Further information can be obtained by writing the engineering department of HUFFORD MACHINE WORKS, INC., Dept. J-4, Redondo Beach, Calif. **934-J**

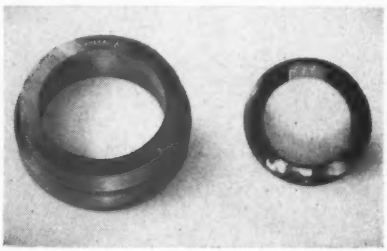
TOOL BIT GRINDER. The Model G Universal Tool Bit Grinding Fixture, recently developed by the Boyar-Schultz Corp., provides for the grinding of any desired chip breaker angle to suit all types of material or conditions. Settings enable any angle to be repeated with the assurance that every bit will be ground exactly the same. The fixture saves time in grinding tool bits and saves critical material because less stock is removed in regrinding. Machine set-up time is cut by uniformly ground bits. With this Boyar-Schultz Universal Grinding Fixture on a surface



grinder, inexperienced operators can quickly produce uniformly ground tool bits for both right and left hand screw machine tools. For further details write BOYAR-SCHULTZ CORP., 2112 Walnut St., Chicago 12, Ill. **612-J**

STOVER LOCK NUT. Designed to resist the loosening effects of vibration, the Stover Lock Nut is a one-piece, hexagonal nut made of a considerably lighter metal than many other known locking devices, resulting in a savings of weight and critical material. The locking principle of the Stover Lock Nut is ovalization of the top portion of the threaded section of the nut. The bottom of the nut, where it first engages the bolt thread, remains round. Since this nut is of all-metal construction, extreme temperatures do not affect this locking principle. A feature of the lock nut is that the torques required to apply and back it off can be adjusted to fit the requirements of the application. It can be screwed halfway by hand onto the bolt but a wrench must be used to bring it down to the work. It will remain firmly seated whether bearing on the work or not, and consequently, can be used as a stop-nut. STOVER LOCK NUT AND MACHINERY CORP., 107 Park Ave., New York 17, N. Y., will send full particulars on request. **941-J**

KNOCKOUT PADS AS MARKERS. The utilization of figures and numbers engraved on the upper surface of a knockout pad for marking part numbers on steel during deep drawing is an economical, automatic method announced by NEW METHOD STEEL STAMPS, INC., 147 Jos. Campau, Detroit 7, Mich. Since the figures and numbers are engraved on the upper surface of the pad, it functions as both



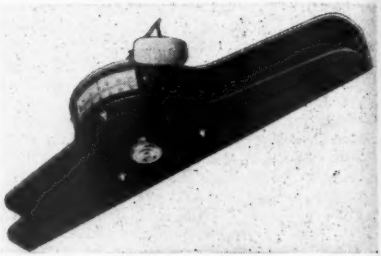
a marking die and knockout pad. On the drawing operation the engraved data is marked on the bottom of the work; on the opening operation, the spring-actuated pad lifts and frees the finished piece. The incorporation of a stamping device as a part of a knockout pad has the additional advantage of eliminating possible errors or omission of marking. **122-J**

PORTABLE DUST COLLECTOR. The new No. 2 Filtaire Portable Dust Collector can be used with dry grinding and polishing and is completely portable, requiring only a 110-volt outlet near the machine. Improved features

on the No. 2 include the new intake and exhaust design. The fan, which is connected to a 1/6 hp motor through a shaft and V-belt, draws in all dust within a wide area in front of the unit. The air is then deflected upward by a baffle plate and is exhausted through two replaceable Dustop filters at the top. Located behind the baffle, the motor is completely out of the airstream. The drive shaft is mounted front and rear in dust-proof bearings which are furnished with

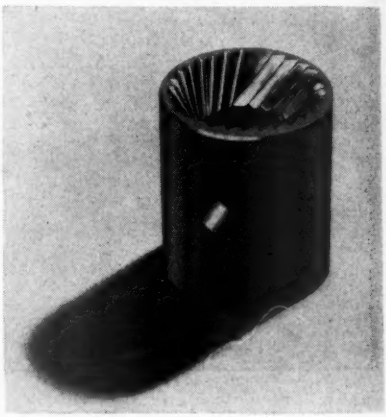
grease gun fittings. Bulletin No. 443 giving details on construction, operation and specifications will be sent by the EDWARD BLAKE CO., 638 Commonwealth Ave., Newton Centre 59, Mass. **78-J**

VERNIER ANGLE GAGE. The Clinometer is a new pendulum-type angle gage used on lathes, drilling presses, shapers, gear hobbers, etc., and for test setups in the inspection room. This Vernier Angle Gage employs the gravity principle and exact angles are indicated on the etched graduated scale. It is capable of measuring any angle up to 360°. The moving rotor has 360 graduations: 0—180° in black and 180—0° in red, thus providing a direct reading of any angle in any position. The reading accuracy of the Clinometer is one minute; the instrument has been tested to a precision of 7½ seconds. A knob thumbscrew brake will slow or stop the



pendulum movement of the rotor, allowing the instrument to be taken off the measured surface to read the dial at greater convenience. ENGIS EQUIPMENT CO., 316 S. Michigan Ave., Chicago, Ill., will send literature on request. **939-J**

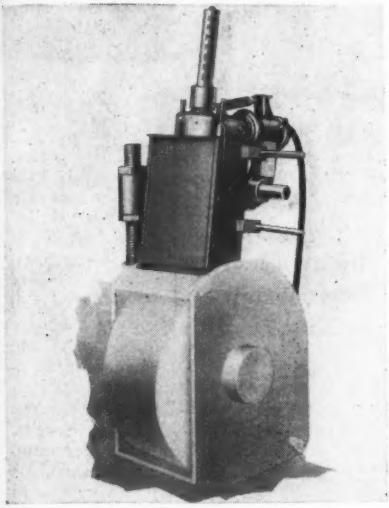
THE DEMAND FOR A PROPER FLOW of lubricating coolant to the working surfaces when high operating speeds and close limits of accuracy are required has led Severance engineers to incorporate a coolant hole in the outside deburring cutter for use on automatic screw machines and turret lathes in which the tool is stationary and the work revolves.



Since the coolant hole is located in the side of the cutter, the flow of coolant is from the inside of the cutter across the cutting teeth, thus cooling the work and washing chips out of the cutter. This hole is used by spanner wrench for a fastening or removing tool. Further details will be furnished by SEVERANCE TOOL INDUSTRIES, INC., Dept. TJ, Saginaw, Mich. **461-J**

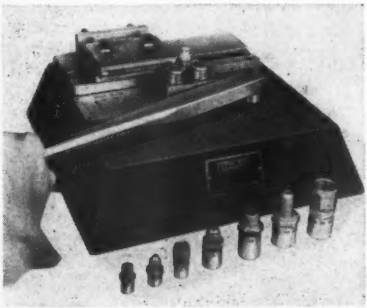
AUTOMATIC COMPOSITION APPLICATOR. Hammond Machinery Builders, Inc., have announced the Auto-Doper, a new automatic air-operated cylindrical and rectangular composition applicator for use on any type of polishing and buffing machine. This applicator is

designed and constructed so simply, it is said, that by merely changing the composition housing it can be used for either cylindrical or rectangular bars. The Auto-Doper is operated by compressed air. The Cylindrical Auto-



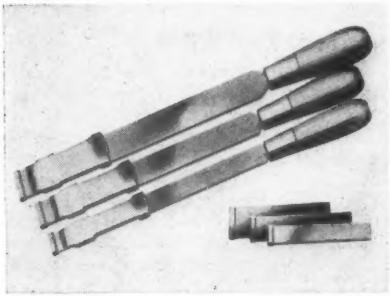
Doper is for cylindrical composition bars up to 2¾" diameter and 10" long; the Rectangular Auto-Doper is for composition bars 2" x 2" and up to 2" x 12" wide and 10" long, for applying composition to wheels 2" to 12" in width. HAMMOND MACHINERY BUILDERS, INC., 1631 Douglas Ave., Kalamazoo, Mich., will send bulletin and prices on request. **95.5-J**

NEW MARKING MACHINE. The new Acromark high production bench model marking machine, originally designed for production marking of a group of hose couplings, is constructed so that it may readily be altered to accommodate parts of like nature. The die holder can take either solid dies or inter-



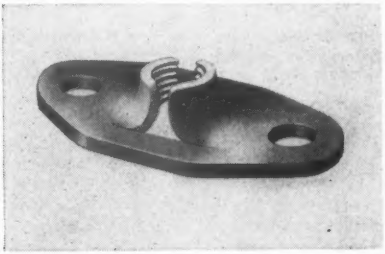
changeable type, both of which can be changed by loosening a single set screw. Manufacturing tolerances on type and dies are carefully maintained so that they may be used in combination if desired. THE ACROMARK COMPANY, 5-15 Morrell St., Elizabeth, N. J. **636-J**

CARBOLOY TIPPED SCRAPER BLADES. Having been tested in some of the largest manufacturing concerns and having proved very successful, Carboloy tipped scraper blades are now available in three widths to fit the Anderson standard line of hand scrapers. These blades have been found to last



from eight to ten times longer than the ordinary blade. It is not necessary to buy new hand scrapers—simply remove the high speed steel blade and insert the Carboloy tipped blade. ANDERSON BROS. MANUFACTURING CO., 1911 Kishwauka St., Rockford, Ill. **190-J**

NEW SPEED NUT. The "Hi-Stress" Speed Nut is a new lighter weight, one-piece integral unit with an unusually low installation torque that allows speedier insertion of screws and bolts which has recently been developed and approved by the Army Air Forces. Among its



features is its interchangeability with nut plate AN362 for high temperature applications in all structures. The "Hi-Stress" Speed Nut conforms to AAF specification No. 25531 and may be identified by No. A6103H-1032. Write TINNERMAN PRODUCTS, INC., 2097 Fulton Rd., Cleveland 13, Ohio. **76-J**

INDUSTRIAL DIGEST

SCIENCE • RESEARCH • METHODS • TOOLING
PRODUCTION • TRADE NEWS AND REPORTS

National Tool & Die Manufacturers Association Activities

The National Tool & Die Manufacturers Association has named Ben Buerk, president of the Buerk Tool Works, Buffalo, N. Y., as its National Counsellor to the United States Chamber of Commerce. This choice was recently announced in Washington by M. W. Rowell, general manager of the association. Mr. Buerk is a member of the board of directors of the National Tool & Die Manufacturers Association and he will represent that body at the Chamber of Commerce Convention in New York City, May 2nd and 3rd.

It was also announced by Mr. Rowell that the Tool & Die Association's first convention will be held in the Statler Hotel, Buffalo, on September 28, 29 and 30. The National Tool & Die Manufacturers Association was organized in September, 1943, with L. A. Sommer, president of the Sommer and Adams Co., Cleveland, as president.

Planning the Future of Your Business

A series of specific suggestions for industrial employers in planning for high postwar levels of production and employment are made in a handbook, "Planning The Future of Your Business", issued by the Committee for Economic Development. The handbook, prepared by a special committee of the Association of Consulting Management Engineers, makes detailed suggestions under six steps in postwar planning.

The handbook is obtainable only through the local Committees for Economic Development now organized in over 1400 communities.

Screw Machine Engineering and Tooling Facilities

Recently organized by W. D. Stites, the Stites Tool Company, Dept. J, 1426 W. 3rd St., Cleveland 12, Ohio, offers a highly skilled and personalized engineering service in the design and manufacture of cams and tools for automatic screw machine production, specializing particularly on Brown & Sharpe automatic screw machine requirements.

Mr. Stites received his fundamental screw machine engineering education with the Brown & Sharpe Mfg. Co. in Providence from 1923 to 1928. After five years spent in several screw machine contract shops in Chicago, he spent eight years with the Weatherhead Co. of Cleveland where he was responsible for the engineering, tooling and production problems attendant upon a department of over two hundred machines. For the three years immediately prior to forming his own company, Mr. Stites headed-up the cam and screw machine engineering department of the Weldon Tool Co. of Cleveland.

Form Society of Plastic Tooling

A group of eastern aircraft engineers recently set up a preliminary organization to be known as the National Society of Plastic Tooling for the announced purpose of facilitating the exchange of information, developments and applications of plastics to production tooling. Delmar Anderson, superintendent of Production Planning and Tool Design of Curtiss-Wright Corporation, Buffalo, was elected president.

A Hot Tip!

IF YOU TIP YOUR OWN TOOLS

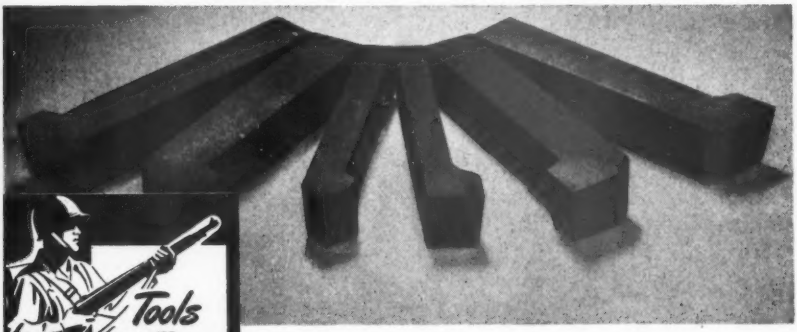
IF you want to get more production out of your present machine tools. . .

Or if you want to lengthen the life of your cutting tools. . .

Try out Cooper-Bessemer's Victory Tool Shanks. Our own machine shops have used them for years. Hundreds of other war production shops are using them, too. They've stood the test, proved beyond question that they can out-perform and out-last the best, most expensive high-speed steel tools.

Victory Tool Shanks are cast to shape of tough Meehanite. They come to you ready to affix your own cemented carbide tips. They require a minimum of finish machining. They pay for themselves many times over in a short time.

Many standard shapes and prices are shown in our Bulletin 53T-2. We'll send you FREE samples to test in your own shop... also quote you on your special shapes. Let us work with you.



THE Cooper-Bessemer CORPORATION

DEPT. J., MOUNT VERNON, OHIO

WPB Clarifies Rating Order P-43 for Laboratories

The War Production Board has issued an amendment to Preference Rating order P-43 clarifying conditions under which priority assistance is given to laboratories. A laboratory is defined, for the purpose of buying materials, as any scientific or technological investigation, testing, development or experimentation carried on by a person, even though he does not have a separate department or organization in his company for such activities.

Experimental models or test runs of materials may be made. Such models or test run products may not be used to promote sales or create consumer demand. If designed primarily for post-war markets, the models or materials may not be exhibited to the public. Restrictions on the quantity of aluminum which may be obtained under the order were removed.

Hand tools and safety equipment bought by a laboratory for resale to its employees for laboratory use may be obtained under the order. Procedure for obtaining controlled materials has been simplified. Complete information is available from WPB District Offices.

"Magnesium-Metal from the Sea"

The Bureau of Mines has released a new educational film "Magnesium-Metal from the Sea" (16mm sound, running time 23 minutes) for short term loans for showings to training classes, industrial and other interested groups. The story of the creation of this essential metal from sea water and from salt brines is unfolded both by animation and by footage of magnesium production plants and equipment. The film also reviews designers' proposed aircraft and other developments and technology. The film may be borrowed on the basis of transportation costs from the Bureau of Mines Experiment Station, 4800 Forbes St., Pittsburgh 13, Pa.

Recent U. S. Patents

Among recently issued U. S. Patents the following are of Tooling interest. If you are interested in studying any of these Patents, simply advise "Patent Information Service", The Tool & Die Journal, 2460 Fairmount Blvd., Cleveland 6, Ohio, enclosing 20 cents for each Patent desired and we will gladly forward your order to Washington.

MECHANICAL MOTION, No. 2,338,533.
HARDNESS TESTING MACHINE, No. 2,338,537.
MACHINE TOOL, No. 2,338,599.
PRESSURE SUPPORTING MECHANISM, No. 2,338,603.
ELEVATING MECHANISM FOR MACHINE TOOL KNEES, No. 2,338,624.
TOOL CHUCK, No. 2,338,626.
FEEDING MECHANISM FOR GRINDING MACHINE, No. 2,338,631.
MACHINE FOR SCALPING BARS, No. 2,338,687.
MOLTEN METAL FOR TEMPERATURE CONTROL, No. 2,338,691.
FATIGUE-TESTING MACHINE, No. 22,416 (Reissue).
MACHINE TOOL, No. 2,338,737.
PORTABLE GRINDING MACHINE, No. 2,338,763.
PORTABLE POWER DRIVEN TOOL, No. 2,338,807.
EXTRUDING APPARATUS, No. 2,338,854.
HEADSTOCK FOR LATHES, No. 2,338,860.
MACHINE TOOL TURRET, No. 2,338,867.
BROACHING MACHINE, No. 2,338,940.
DEVICE FOR CUTTING THREADS SIDEWISE WITH AUTOMATICALLY WITHDRAWING TOOL, No. 2,338,951.
ADJUSTABLE HONE, No. 2,338,963.
TOOL FOR CUTTING GROOVES, No. 2,338,972.
CONTROLLING MECHANISM FOR LATHES, No. 2,338,975.
SELF-CONTAINED DIE SET, No. 2,338,982.
RELEASE MECHANISM FOR BROACH PULLING CHUCKS, No. 2,338,989.
METHOD OF PRODUCING TOOLS, No. 2,338,990.
AUXILIARY CARRIAGE FOR TURNING LATHE CUTTERS, No. 2,339,016.
BLANK FORGING MACHINE, No. 2,339,019.
MICROMETER, No. 2,339,031.
FORMING DIE, No. 2,339,032.
TRANSMISSION AND CONTROL MECHANISM, No. 2,339,102.
AUTOMATIC LATHE, No. 2,339,140.
METHOD AND APPARATUS FOR FORMING COMPOSITE METAL ARTICLES, No. 2,339,141.
TOOL FOR PERFORMING INTERNAL MACHINING OPERATIONS AT AN ANGLE TO THE AXIS OF BORES OR TUBULAR MEMBERS, No. 2,339,171.
SAFETY CONTROL FOR PUNCH PRESSES AND THE LIKE, No. 2,339,214.
METHOD OF CASE HARDENING, No. 2,339,223.
PERFORATING PUNCH AND DIE ASSEMBLY, No. 22,422 (Reissue).
DIE CASTING MACHINE, No. 2,339,265.
ABRADING MEANS, No. 2,339,270.
GEAR CUTTING METHOD AND MACHINE, No. 2,339,375.
LATHE, No. 2,339,400.
MACHINE TOOL, No. 2,339,435.
INJECTION MOLDING MACHINE, No. 2,339,443.
AUTOMATIC DRILL PRESS, No. 2,339,597.
HYDRAULIC GEAR SHIFTING AND DRIVING SYSTEM, No. 2,339,604.
MILLING MACHINE, No. 2,339,630.
APPARATUS AND METHOD FOR MECHANICAL BRAZING OF DIAMONDS, No. 2,339,659.
APPARATUS AND METHOD FOR MECHANICAL BRAZING OF DIAMONDS, No. 2,339,660.
MACHINE FOR PRODUCING GEARS, No. 2,339,679.
MACHINE FOR CONFIGURING TUBING, No. 2,339,686.

With both molybdenum and tungsten again available for use in high speed steel, consideration of their comparative performance is timely.

Before the war, a careful recording of comparative tests converted many users and tool makers to molybdenum high speed steel. During the tungsten shortage, when use of a high percentage of molybdenum types became mandatory, most users could not watch the performance of their tools carefully enough to draw conclusions on their respective merits.

Reports from large tool producers and users confirm that molybdenum high speed steels, when properly heat treated, perform at least as well under different kinds of shop conditions as the tungsten types which they replace.

Given equal performance on any particular type of work, an investigation of the saving in machining cost effected by molybdenum steels will prove well worth while.

CLIMAX FURNISHES AUTHORITATIVE ENGINEERING DATA ON MOLYBDENUM APPLICATIONS.

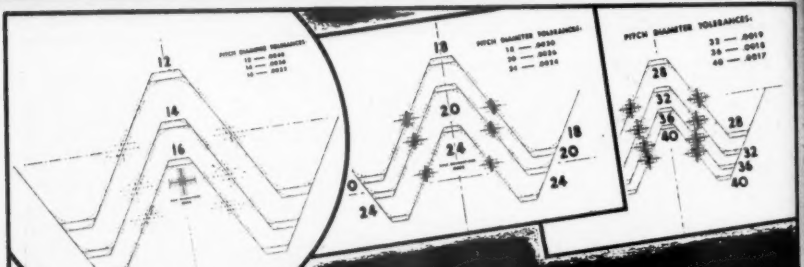
ARMY E NAVY

MOLYBDIC OXIDE, BRIQUETTED OR CANNED • FERROMOLYBDENUM • "CALCIUM MOLYBDATE"

Climax Molybdenum Company

500 Fifth Avenue • New York City

MOLY



PRECISION

Thread FORM CHARTS

Painstakingly prepared with the highest degree of accuracy on heavy, clear, non-breakable plastic . . . all types, American National Fine, British Standard Whitworth, all Standard Pipe Thread series, etc., rectangular, circular or square, at standard magnifications. In use by leading plants throughout the country. Moderate in cost, yet the final word in performance!

STANDARD RADII
AND SPECIAL INSPECTION CHARTS

Similarly prepared with finest precision on same heavy plastic . . . circular, rectangular or square . . . for every comparator and inspection purpose.

Gage COMPANY DIVISION
BATTLE CREEK, MICHIGAN

Write for complete particulars

TD444

PUBLICATION PREVIEWS

SALES AND TECHNICAL LITERATURE

Send Request on Company Letterhead

TYPE "B" SPEED VISES which greatly reduce the time lost in loading and unloading work pieces are the subject of Bulletin No. 22 issued by the CARDINAL MACHINE CO., Dept. T, Glendale 5, Calif. Ample stock is provided in the vise jaws to permit drilling and tapping for attaching drill jigs or locating fixtures, and the ground surface of the jaws is ideal for the mounting of such parts. Or, if preferred, a removable type of jig or fixture can be bolted through the back of the jaw. **226-J**

REXALLOY TIPPED TOOLS, a companion product to Rexalloy Tool Bits, are presented in a folder released by the CRUCIBLE STEEL CO. OF AMERICA, Dept. D, 405 Lexington Ave., N. Y. C. Excellent red hardness and superior toughness characterize these tools. They can be ground for turning, boring, facing, chamfering, threading and similar applications. Listed in this folder are the available standard size tipped tools and prices. **256-J**

HAMILTON PRECISION GEAR HOBBING MACHINES are described in Catalog No. 123 issued by TRIPLEX MACHINE TOOL CORP., Dept. J, 125 Barclay St., New York 7, N. Y. The two machines were primarily designed to represent the American standard for a type of machine tool of which the Swiss had long been the exclusive manufacturers. The Hamilton No. 00 Spur Gear Hobber takes work from less than .1" to 2" outside diameter, has a maximum feed of 1.6" and produces small fine pitch spur gears and pinions for precision instruments rapidly and accurately. The No. 1 Spur and Spiral Gear Hobber takes work up to 6" outside diameter and produces precision gears, wheels, aircraft and navigation instrument parts, fire control apparatus and a wide range of brass and steel spur and special gears, right-hand as well as left-hand. Full specifications and operating data are given. **497-J**

PARK CHEMICAL COMPANY'S newest literature is descriptive of their Salt Baths, Carburizers and Protective Coatings for Steel. Park Chemical Company has pioneered in the field of liquid and solid carburizers, resulting in the development of W. P. Woodside's Rapid Carburizer Compound in 1911, and, with over 31 years of experience, is capable of giving expert metallurgical advice on heat treating problems. A complete metallurgical laboratory is constantly working on new products and is available for assistance at any time. A complete line of salts is available for temperatures from 300° F. to 2400° F. Park's Salt Baths for reheating and "light" cyanide cases, Neutral Salt Baths and Salt Baths for drawing operations and for nonferrous metals are fully covered in Bulletin 100, while a separate 4-page bulletin deals with Park Carburizers for pack hardening and liquid carburizing, Woodside's Rapid Carburizers for pack hardening, Carburizers for armor plate, and Park-Kase Liquid Carburizers. An additional 4-page circular deals with protective coatings for steel and describes Park's No-Carb for the prevention of carburization or decarburization, and their No-Case for selective carburization in liquid baths. Detailed information on Park products and services may be obtained from PARK CHEMICAL CO., Dept. J, 8074-8110 Military Ave., Detroit, Mich. Please designate specific bulletin desired. **756-J**

ZAGAR CHUCKING TOOLS—A wide variety of work can be handled profitably with Zagar Chucking Tools. Their new bulletin is profusely illustrated with "case histories" showing applications of their Holding Fixtures and Indexing Fixtures. High production rates with resultant economies are made possible by most simple and efficient set-ups which in many of the cases illustrated also serve to eliminate special tooling, special fixtures to suit individual jobs, and involved multiple set-ups. Chip trouble, in the case of work done with Zagar fixtures, is reduced to a minimum or entirely eliminated, since the coolant is forced upward and rapidly scavenges the chips away from the cutting zone. Zagar fixtures are available in two types—for indexing or for holding. Each type is furnished in two

sizes—1" and 2". Any indexing division from 2 to 25 is offered. Standard collets and pads are used in all Zagar fixtures. For additional information and prices write to ZAGAR TOOL, INC., Dept. TD, 23880 Lakeland Blvd., Cleveland 17, Ohio. **650-J**

BHICO DIE HEADS—Featured in a descriptive bulletin complete with specifications, accurate, speedy thread cutting is assured with these Die Heads. A wide range of capacity of each size die head results in a small investment and an ideal general purpose thread cutting tool. This new (patent pending) all purpose, self-opening die head automatically opens at a pre-determined length of thread, and it may be instantly withdrawn from the work without reversing machine. Additionally, it may be instantly set from a roughing cut to a finishing cut. Illustrated literature and specifications are obtainable from B-H INSTRUMENT CO., Dept. J, 3321-23 Ave. S., Brooklyn 10, N. Y. **933-J**

ARNOLD TOOLS — Obtainable singly, in quantities, or in graduated sets, the Arnold line of cutting tools is detailed and illustrated in a new 35-page catalog covering their Machine Countersinks, Center Reamers, Counterbores, Spot Facers, Reamers, Laps and Arbors, and Woodruff Key Seat Cutters. Arnold Counterbores are offered both solid and with interchangeable pilots, straight shank or taper shank. Liquid bath heat treatment and consequent non-exposure of the tools to air while being hardened, insures uniformity and the elimination of scaling and burning. Arnold also designs and produces special tools to specifications. Inquiries should be addressed to ARNOLD TOOL CO., Dept. D, 14469 Euclid Ave., Cleveland 12, Ohio. **934-J**

PLUG GAGE HANDLES—Specializing exclusively in the manufacture of plug gage handles, a circular issued by the Huron Machine Products illustrates and gives specifications of their complete line of taper-lock and tri-lock handles all of which conform to American Gage Design Standards from the smallest (000) to the largest (No. 7). For their all-steel handles Huron stresses the advantages of weight balance, sensitivity due to metal-to-metal contact between handle and gage member, firmer grip and greater handling comfort due to hexagonal shape, and low price. Further information is available from HURON MACHINE PRODUCTS, Dept. T, 5555 Conner Ave., Detroit, Mich. **935-J**

HAINES GAGES — A new bulletin featuring a wide range of precision gages — plug and ring, snap and profile, flush-pin and special design gages—is ready for distribution by HAINES GAUGE CO., Dept. T, 2301 W. Allegheny Ave., Philadelphia 32, Pa. A group of shop photographs which, in effect, take the reader on an inspection tour of the plant, illustrate the thoroughly modern equipment, con-

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Precision **KLUTCH-KOLLET**

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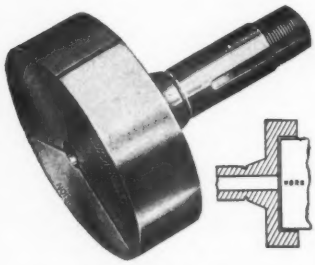
Permits Chucking Work to 2¾" Diameter with Collet Accuracy . . . For 10" ATLAS, LOGAN, 9" SOUTH BEND, 12" CLAUSING, 12" CRAFTSMAN, POWR-KRAFT, HARDINGE No. 3 LATHES, ETC.



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. . . of the new L & I GROUND FLUTE REAMER price list

The new prices on L & I Ground Flute Reamers now make the superior results and longer life of these ground flute reamers available at the price of ordinary milled flute reamers.

SUPERIOR PERFORMANCE

L & I Ground Flute Reamers have the keenest cutting edge possible, because it is ground on both faces after being heat-hardened in bar form. They are ground from the solid, making possible greater uniformity and accuracy. Carefully lapped before grinding, they have many times the useful life of non-lapped reamers, and therefore cost less to use.

AT LOWER COST

— LAVALLEE & IDE L&I CHICOPEE, MASS. —

trol and inspection devices in use. In keeping with work that must be performed to A. G. D. specifications is the generous departmental distribution of dimensional control equipment—mechanical, electrical and optical inspection tools and instruments. Inquiries on gage procurement or design are invited. **932-J**

"INDICATING PLUGS"—a new circular illustrating precision gaging equipment has been published by METRICAL LABORATORIES, INC., Dept. 10, 417 Detroit St., Ann Arbor, Mich. Both bench fixture type indicating plugs for small parts and handle type indicating gages for measuring through deep or long holes are described. The M. L. Guide Sleeve, used for most gages of either type, is shown. **884-J**

MEEHANITE ENGINEERING HANDBOOK which gives a comprehensive story of Meehanite, its applications and physical properties has been issued by the HAMILTON FOUNDRY & MACHINE CO., Dept. J, 1551 Lincoln Ave., Hamilton, O. Meehanite is made to various specifications, according to service requirements, and makes available an unusual selection of irons that resist growth, warpage, and scaling, and under certain conditions resist corrosion to a high degree. **309-J**

PRODUCTION FACILITIES DATA — sheet steel and light plate work, fabricated steel plate machinery bases and assemblies—are presented in an illustrated booklet issued by the KIRK & BLUM MFG. CO., Dept. J, Cincinnati, O. A specialty of this company is custom-built machinery bases. An equipment list of Kirk & Blum machines gives an adequate idea of its fabricating facilities. **350-J**

LIBERTY PLANERS—Three types of new design, heavy duty, fast operating planers are detailed in Catalog No. 152 issued by LIBERTY PLANERS, INC., Dept. J, Hamilton, O. Specifications and outstanding features of six sizes of Open Side and Double Housing Planers from 36" to 72" are presented. Data on the Convertible Type Planer, also available in six sizes, is included. Planers, tooled and jigged to be as nearly interchangeable as possible, are designed for rapid, easy handling with required accuracy and rigidity. **366-J**

ELECTRIC FURNACES AND PYROMETERS are detailed and illustrated in Catalog No. 58 published by HOSKINS MFG. CO., Dept. D, Lawton Ave. & Buchanan St., Detroit, Mich. The first of four sections covers the heat treating furnaces; a laboratory section lists the muffle, combustion and crucible furnaces; a third section includes pyrometers, thermocouples, indicating meters and the Hoskins Automatic Temperature Controller; the fourth section describes the pyrometer accessories in the line. **323-J**

LATHES — The L & S Selective Head Lathes — engine, tool room, manufacturing — as well as special lathes such as duomatic, oil country and gap, are profusely illustrated and detailed in a catalog recently issued by LODGE & SHIPLEY MACHINE TOOL COMPANY, Dept. J, Cincinnati

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● Widely used throughout industry and trade schools, "Tool Steel Simplified" meets the urgent need for a complete, up-to-date text for training new men, "refreshing" older men, or trouble shooting in the tool room. Tells in easy shop language how to select tool steel, how to make tools, how to improve tool performance. It is available *at cost*, $1.00 per copy, to tool steel users in the U. S. A.

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Precision must be the watchword of both the falling bombs and the sweetly purring engines to assure a successful mission. Just as the Norden bomb sight provides pin-point aiming when the bay doors swing open above a target, so Perfex gages impart that final touch of precision accuracy to the giant power plants. This kind of teamwork spells top flight performance all around. While serving war production needs, Perfex devoutly hopes soon to be filling post-war requirements.

★ Perfex manufactures thread plugs, thread rings, plain plugs, plain rings and special thread gages to blueprint. For complete information and prices wire or write our sales department today.

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25, O. Specifications, construction and design features, equipment and available attachments are included. There is a very interesting section on the cycles and setting up diagrams of the No. 3A Duomatic fully automatic lathe. **46-J**

TWO-IN-ONE FILING MACHINE—The "Duplex" Die and Punch Filing machine, with a controlled downward movement for filing and lapping otherwise inaccessible places, is the subject of a circular being distributed by the IDEAL TOOL & DIE CO., INC., 735 Congress St., Schenectady, N. Y. Its two tables, each 10" square, may be conveniently adjusted. Further information is available. **147-J**

HORIZONTAL MILLING MACHINE—which combines slow RPM (for cutting tough alloy steel), and advanced speeds for regulation duty is illustrated in a 4-page leaflet issued by INDUSTRIAL TOOL & DIE WORKS, INC., Dept. T-J, Minneapolis, Minn. An unusual feature in a machine in its size and price class is a double over-arm for rigidity and accurate performance. **333-J**

GROUND FLUTE REAMERS—The L & I straight flute—straight shank ground flute reamers of hi-speed steel—are quoted in a leaflet issued by LAVALLEE & IDE, INC., Dept. T, Chicopee, Mass. L & I reamers are ground from the solid, making it possible to control the uniformity and accuracy of all dimensions to the highest degree and are carefully lapped after grinding. Further information is available upon request. **641-J**

"OPERATION AND MAINTENANCE REVIEW"—The first issue of the Allis-Chalmers new pocket-sized magazine to be issued bimonthly is now available. Containing maintenance tips and timely articles on current shop and plant practice, the Review will prove valuable to shopmen and executives. The ALLIS-CHALMERS MFG. CO., Dept. J, Milwaukee 1, Wisc. **183.5-J**

MALLORY PRECISION PRODUCTS including the complete line of Mallory radio, electrical and electronic parts with sizes, specifications and rated capacities, together with list prices are featured in the new 1944 catalog issued by P. R. MALLORY & CO., INC., Dept. T, 3029 E. Washington St., Indianapolis 6, Ind. Positive starting, easy installation, freedom from lead breakage and failures due to lead corrosion and freedom from broken reeds are characteristics of the Mallory Replacement Vibrator. **873-J**

"SHIPPER'S HANDY HELPER" is the title of a 48-page booklet containing helpful information on shipping problems together with a complete catalog of various supplies and devices which are used in the packing and shipping departments. "U. S. Army Specifications for Marking Shipments" are included along with Metric Conversion Tables. Further information is available from the DIAGRAPH-BRADLEY STENCIL MACHINE CORP., Dept. J, 3745-51 Forest Park Blvd., St. Louis, Mo. **871-J**

GAS APPLIANCES—including furnaces, burners, blowers, torches, mixers

FOR GENERAL BORING
The angle of the cutting edge and the special helical backed-off form of the front of the tool produces a free-cutting action.
STYLE A
FOR FACING and BOTTOMING
Especially suitable for use on turret lathes and automatics—particularly adaptable for recessing.
STYLE B
FOR INTERNAL THREADING
Engineered to give clearance in chasing internal threads. Capacity from ¼" dia. hole up, and from 2 to 65 threads per inch.
STYLE C
Ask for Catalog E-1139 for Super High Speed Tools and for E-396 for Carbide Tipped.

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To give our fighting forces the increased striking power of more and better weapons, Industry's skilled manpower must have the increased producing power of fast, accurate tools.

South Bend Lathes squarely meet this requirement. Their rigidity and wide range of spindle speeds permit taking full advantage of the higher cutting speeds of carbide and diamond tipped tools. Their precision makes it possible to finish turn and bore with such accuracy that subsequent grinding and honing operations can often be eliminated.

BUY WAR BONDS

South Bend Engine Lathes and Toolroom Lathes are made in 5 sizes—9″ to 16″ swings. The Turret Lathes are made in 2 sizes. Write for catalog. *South Bend Lathe Works, South Bend, Indiana.*

and valves are illustrated in Catalog 43 published by the JOHNSON GAS APPLIANCE CO., Dept. TD, 624 E Ave., Cedar Rapids, Ia. Complete specifications for each type of furnace are given. Included is the popular No. 120 Hi-Speed Heat-treating Furnace available in either bench or pedestal style. This furnace is widely used for hardening punches, dies and tools in both small and large shops. **605-J**

GRIFFIN'S HYTEMP PROTECTIVE COATING—a liquid chrome coating for heat treating operations, in selective hardening operations by either carburizing or nitriding and as c resist against spatter of welding or flow of brazing material and flux, is the subject of a leaflet released by GEO. R. MOWAT CO., Dept. T, 24 W. 40th St., New York 18, N. Y. Easy to apply, capable of resisting temperatures up to 3500° F, Hytemp gives high electrical resistance and may be removed without leaving any blemish. **882-J**

HYDRAULIC PRESSES that serve the metal working, automotive, machinery, engine, ship and aircraft builders, laminating producers and motor manufacturers are profusely illustrated in Bulletin No. P5M43 published by the A. B. FARQUHAR CO., Dept. D, Hydraulic Press Div., York, Pa. A section picturing numerous installations gives product and production data. **288-J**

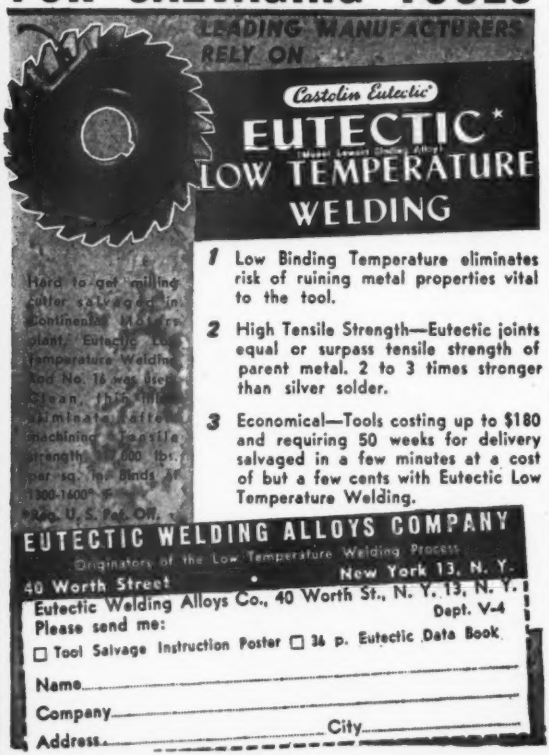
SHAKEPROOF FASTENINGS are presented in a profusely illustrated catalog issued by SHAKEPROOF, INC., Dept. J, 2501 N. Keeler Ave., Chicago, Ill. The constructive fastening ideas offered are logical for both war and peacetime production. A feature is the series of fold-in oversize pages which picture groups of applications in shipbuilding, aircraft, mobile electrical and communication equipment. Many practical application suggestions are presented. Thread cutting screws for both metal and plastics and cowl fasteners are also shown. **700-J**

HYDRAULIC FITTINGS are indispensable in making a complete airplane, states a colorful catalog which presents some of the products A. S. P. is equipped to manufacture. The part numbers of fittings listed are coded according to mnemonic system of symbols which distinguishes them as either Air Corps (AC) triple type standard weight fitting, Army-Navy (AN) or Naval Aircraft Factory (NAF). The new ASP Universal Check Valve for Aircraft Hydraulics is included. Further information is obtainable from AMERICAN SCREW PRODUCTS, Dept. T, 7000 Avalon Blvd., Los Angeles, Calif. **188-J**

CONTRACT SHOP SERVICE is offered by the BUNELL MACHINE & TOOL CO., 1601 E. 23rd St., Cleveland 14, O., manufacturers and designers of tools, special machinery, dies, jigs, gages and fixtures. Their 4-page bulletin lists the comprehensive range of machines and special tools in use by the company. Bunell offers quality contract shop service as well as precision production of parts and assemblies. Further information is available upon request. **886-J**

CARBON SEAL RINGS and their application to the

FOR SALVAGING TOOLS


LEADING MANUFACTURERS RELY ON
Castolin Eutectic
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LOW TEMPERATURE WELDING
Hard to get milling cutter salvaged in Continental Motors plant. Eutectic Low Temperature Welding Rod No. 16 was used. Clean, thin fillet eliminated after machining. Tensile strength 87,000 lbs. per sq. in. Binds at 1300-1400° F.
*Reg. U. S. Pat. Off.

1 Low Binding Temperature eliminates risk of ruining metal properties vital to the tool.

2 High Tensile Strength—Eutectic joints equal or surpass tensile strength of parent metal. 2 to 3 times stronger than silver solder.

3 Economical—Tools costing up to $180 and requiring 50 weeks for delivery salvaged in a few minutes at a cost of but a few cents with Eutectic Low Temperature Welding.

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A secret in "wringing"!

● It is a not too closely guarded secret. The U. S. Bureau of Standards (see *Scientific Papers of the Bureau of Standards, No. 436, Part of Vol. 17, P. 691, "Interference Methods of Standardizing and Testing Precision Gage Blocks"*) has stated explicitly that in making accurate calibration of gage blocks, the error introduced by oil or other film should be eliminated.

Certainly, it is a demonstrable fact that if such film is used in wringing gage blocks, some impairment will result in the extreme accuracy of measurements made by the blocks and in their wringing qualities.

Write for FONDA'S bulletin, "Precision in Millionths," which tells of the new "ULTRA-FINISH" that makes *the use of oil or other films unnecessary* in wringing FONDA Gage Blocks.

FONDA'S advanced methods in gage block manufacture have made FONDA the choice in many vital plants and laboratories, for critical precision measurement.

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GAGE COMPANY

MFRS. OF FONDA GAGE BLOCKS

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Agents in all principal cities throughout the World

24

bellows type shaft seals are the theme of an illustrated booklet issued by the PURE CARBON CO., INC., Dept. J, St. Marys, Pa. The features of carbon seal rings are detailed with relation to specific uses. For example, Pure Carbon Grades BH-1 and T-2 seals are recommended on automobile water pumps. Grade BH-1 is preferred on seals having an irregular outer periphery, as this material can be held very closely to the mold size. The T-2 grade, on comparative tests with BH-1, generally gives longer life. Information of a similar nature is given in this folder on steam turbine seals, air seals, seal noses, etc. **885-J**

THE FLEXIMATIC—an automatic indexing machine utilizing the method pioneered and developed by KINGSBURY MACHINE TOOL CORP., Dept. TD, Keene, N. H., for performing various machining operations in a single chucking of the work, is detailed and illustrated in Bulletin 5-40 issued by the company. The indexing unit of the 12" Fleximatic is available in even numbers of stations from four up; the 20" in even or odd numbers from four up. The Kingsbury Semi-Automatic Vertical Drilling Machines, designed around the Model 8 Sensitive Feed Unit, are shown in "Production Drilling Machines," Bulletin 6-41. Two bulletins describe the Kingsbury Drilling and Tapping Units — Bulletin 7-41 describes the lighter units, Models 8, 18, 14, 30 and 30T; Bulletin 5-38 describes the heavier units, Models 12, 13, 22 and 23. Please specify bulletin desired. **349-J**

PUMP ENGINEERING MANUAL—describing the various models and sizes of Pioneer and Rollway Coolant and Lubricant Pumps, has recently been issued by PIONEER PUMP & MFG. CO., Dept. D, 19679 John R St., Detroit 3, Mich. Engineering information on the two types, the Pioneer, an open impeller type pump, and the Rollway, a rotary mechanical type pump, include complete ratings, performance and applications. A parts list for each model adds to the practical value of the catalog. An alphabetical index and an "illustrated selector"—a picture guide to pumps and accessories—help make it a very comprehensive compilation. **427-J**

DIEING MACHINES for high production stamping from progressive dies utilizing roll feeds are fully illustrated and described in a 34-page catalog issued by the HENRY & WRIGHT MFG. CO., Dept. T, Hartford, Conn. Features incorporated in these machines are: a low center of gravity, allowing high speed with minimum vibration; a maximum guiding surface, including a four-post guide to punchholder; a pulling stroke applied to the die instead of the usual pushing stroke; the flywheel, crankshaft and connection are located below the punchholder instead of above. Data on all ten Dieing Machines in the line, the H & W Roll Feed, Automatic Reels and Feeds, Stacking Chutes and Scrap Cutters is included. **316-J**

BEFORE THE WAR

Strenes can be cast to shape. Most of the usual machining time is saved. Redressing is reduced. That is why before the war Strenes gained heavily as a forming and drawing die metal. In one case around 2,000,000 stampings were obtained and the die is still in good condition ready to resume operation at the end of the war. Runs of 100,000 pieces up are not uncommon.

Hundreds of the largest plants in the country used it regularly in their tooling programs. Want the names of pre-war users of Strenes?

IN THE WAR

Strenes today is being used for draw pots, draw pot inserts, draw rings for draw bench operation, for progressive upsetting dies . . . all in shell manufacture. Glad to identify all such users and many others.

AFTER THE WAR

After the war, refrigerator, stove, metal casket, grave vault, farm implement and other manufacturers will resume with Strenes metal forming and drawing dies. Many of the automobile, truck and tractor builders are extensive users, for body, fender and hood dies. Will name them to interested inquirer .

Look into the merits of Strenes metal . . . Try it, at least once.

The Advance Foundry Company

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Sometimes a company gets a reputation for producing one particular item better than it can by made by others.

Vinco, pioneering involute splines and their inspection, is known, nationally, for the excellence and accuracy of the involute spline gages made here. Vinco's Involute Checker and Vinco's Dividing Head have been considered "tops" by many key companies using them.

But this is not all that Vinco excels in. Every type of fixed limit gage is made by Vinco with the same unerring skill; fixtures of many kinds and —well, the list is long and is partially shown at the bottom of this page. Look it over and you will probably see items you didn't know were made by Vinco. And remember that 1000 Vinco craftsmen work together to produce Vinco quality.

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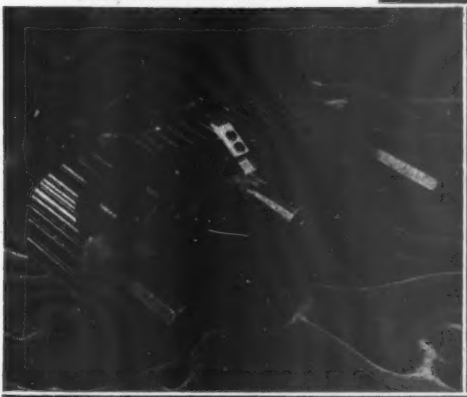

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Semi-Automatic Hydraulic Spline and Gear Grinder • Optical Master Inspection Dividing Head • Involute Checker • Angle Tangent to Radius Dresser • Index Plates • Precision Vises • Sine Bars • Straight-side Spline, Serration Spline, Involute Spline and Helical Spline Plug and Ring Gages • Thread Plugs, Rings and Setting Plug Gages • Spur and Helical Master Gears • Munition Gages • Propeller Hub Gages • Built-up and Special Gages • Gear Rolling Fixtures • Spline and Index Fixtures • Hydraulic Power Control, Utilization and Distribution Units • Engineering, Design and Development

FITCHBURG MULTIPLE PRECISION GRINDING—a new catalog describes many advantages of Fitchburg Bowgage Grinding Wheelhead Units. The Bowgage, a complete, independent, precision grinding wheelhead unit, is available in single units or for multiple installations. The units have a high degree of application due to interchangeability and adaptability to quick changeover. A number of special applications, including weapons and shell, are illustrated by both photos and drawings. Specifications of the Fitchburg 6" and 10" Plain Cylindrical Automatic Precision Grinders are included. Further information is available from the FITCHBURG GRINDING MACHINE CORP., Dept. J, 1503 Walnut St., Fitchburg, Mass. **115-J**

MILLING-BROACHING-GRINDING-LAPPING and Cutter Sharpening machines are illustrated and detailed in the new General Catalog M-995-2 released by the CINCINNATI MILLING & GRINDING MACHINES, INC., Dept. TD, Cincinnati, Ohio. The Centerless Grinder No. 2 is recommended for rapidly grinding small to average sized parts having straight cylindrical, taper or special shapes and for grinding any material from plastic to hardened steel by the infeed or thrufeed methods. Information on two additional machines and data on grinding machine attachments and accessories have been added. **233-J**

CVH-60 PNEUMATIC VISE—which cuts loading and unloading time of work on any standard milling machine more than half is detailed and illustrated in a recent 4-page bulletin issued by the BELLOWS CO., Dept. T, 861 E. Tallmadge Ave., Akron, O. Quickly installed in a few minutes without drilling of holes or alterations in equipment, the CVH-60 automatic milling machine vise has jaw opening capacity sufficient to replace many larger holding fixtures. The double acting valve, operated from any angle in any plane, is equipped with the universally adjustable Bellows finger-tip control. Other advantages are listed in the bulletin. **839-J**

Two New DE-STA-CO Clamps for AIRCRAFT JOBS

Model 462-B **Model 462**

Two light weight, small, portable toggle clamps, especially suited for clamping work where space limitations prohibit use of larger tools. Both clamps same size, 7¼" long overall. Note generous throat size. Much quicker acting and more easily handled than "C" clamps.

Model 462-B is provided with thumb screw and lock nut gap adjustment.

Model 462 has the De-Sta-Co Pressure-Matic feature, which provides automatic gap adjustment for any clamping thickness from 0" to ⅜" . . . no manual adjustment necessary.

Other sizes available; send for literature.

DETROIT STAMPING CO.
Established Over 25 Years
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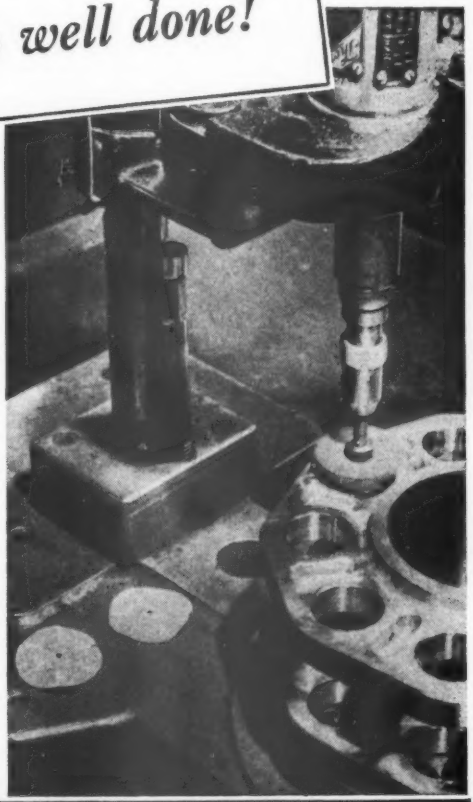
"METAL MARKING EQUIPMENT FOR INDUSTRY" is the title of an interesting 16-page booklet issued by WM. A. FORCE & CO., Dept. J, 216 Nichols Ave., Brooklyn 8, N. Y. The various machines which meet practically any requirement for marking on metal include hand presses, numbering heads, power presses, embossing heads, rotary marking machine, special assemblies, knurling machines, marking machines and accessories, steel stamps and dies, steel indenting type, heavy-duty steel type, type holders and indenting detail press. **293-J**

PALMGREN ANGLE VISES for tool room, bench and production lines are illustrated in two leaflets issued by CHICAGO TOOL & ENGINEERING CO., Dept. J, 8383 S. Chicago Ave., Chicago, Ill. Both cover the Angle and Drill Press Vises, Heavy Duty Angle Vises and Heavy Duty Production Vises. Circulars on Welder's Micrometers and Rapid Cable Connectors are also available. **591-J**

Right at the edge of a job *well done!*



Use of Slotted Abrasive Cloth Discs by Carborundum has resulted in amazing simplification of deburring and polishing operations on holes from 3/8" to 5 1/2" in diameter. Discs proportionately larger than the holes they are designed to deburr and polish are attached to power driven spindles. Pressed against the work, the discs cone, and give a true radius to the edges of the holes without touching the sides. It's a fine example of choosing the right abrasive product for the job.

The use of abrasives in deburring, polishing, and in tool room work has seen an enormous advance in the last year or so. That's why we urge you to call on Carborundum Abrasive Engineering Service for help with your abrasive problems. Just call our nearest sales office. The Carborundum Company, Niagara Falls, N.Y.

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(Carborundum is a registered trade mark of and indicates manufacture by The Carborundum Company)

HORIZONTAL BORING, DRILLING AND MILLING MACHINES — Four catalogs, covering the very complete line of G & L High Power Precision Horizontal Boring, Drilling and Milling Machines, are available for distribution by GIDDINGS & LEWIS MACHINE TOOL CO., Dept. J, Fond du Lac, Wis. Series 30 Catalog lists the complete specifications of the standard Planer-Type Machines; Series 3 Catalog does the same for the standard Multiple Head Machines; the Series 50 Catalog covers the improved two spindle Planer Type Machines; the Series 70 Catalog surveys Table, Floor and Planer Type two spindle Machines. Please specify catalog. **43-J**

REFRIGERATION EQUIPMENT consisting of unit coolers, water coolers, ice makers, condensers, coils, baffles and blowers are presented in Catalog No. R142 published by the KRAMER TRENTON CO., Dept. J, Trenton, N. J. Wall Panel, floor or ceiling types of space coolers, low temperature unit coolers with either electrical heater or tap water defrosting are shown. The Kramer Unicon, self-contained air-cooled, remote type condenser shell and fin tube condensers, heat exchangers, and streamline coils are shown with full specifications. An engineering data section gives refrigeration load calculations for both air cooling and low temperature chilling applications. **93-J**

AMES PRECISION MILLING MACHINES are illustrated in Bulletin No. C 100 issued by B. C. AMES CO., Dept. J, Waltham, Mass. These bench milling machines, well suited for production work or short runs to relieve larger machines, are self-contained, portable, require little floor space ond operate with ½ hp motors. Large in size and capacity for machines of their type they will handle a wide range of work and are used in many production departments and tool rooms making micrometers, small tools, and other small parts which must be milled accurately. **189-J**

COLLET CHUCK

● **CAN'T-SLIP.** Exclusive Wedge-Lock feature prevents slippage when working either soft or hardest alloy steel, even when material is several thousandths over or under size.

● **ACCURATE.** Combination draw-back and push-out action holds material securely against stop, insures accurate stock length.

● **NO LUBRICATION** of the Armor Collet Chuck is necessary.

● **RUNS COOL.** Revolves with spindle, and so requires no bearings or gears to generate heat or consume power.

● **FULL SPINDLE CAPACITY** for small lathes having 1½"-8 thread spindles.

● **COLLETS IN STOCK.** Collets are available to full spindle capacity in round, square or hexagon type. Adapters are obtainable to accommodate other well known collets.

● **PROMPT DELIVERY.** Write today for Bulletin.

AIRCRAFT MACHINERY CORP.
214 W. Orange Grove, Burbank, Calif.

PRECISION CLEANING EQUIPMENT and cleaning and rinsing compounds are described and illustrated in complete catalog material issued by L & R MFG. CO., Dept. T, 577 Elm St., Arlington, N. J. L & R cleaning and rinsing solutions are being used for cleaning instruments, meters, gages, clocks, ball bearings, parking meters, jewels, electronic parts and related precision units. The L & R industrial precision cleaning machine, also described, cleans, rinses, polishes and dries small parts to highest inspection standards. Further information is available from the company. **352-J**

HOW TO CUT METAL LIKE CHEESE is a four-page, illustrated folder containing complete specific information on the advantages, uses, types and speeds of true, cool, fast cutting Radiac Abrasive Cut-Off Machines and Abrasive Cut-Off Discs. This folder is issued by A. P. DESANNO & SON, INC., Machine Sales Div., 464 Wheatland St., Phoenixville, Pa. **262-J**

STANDARD CARBOLOY TOOLS
SET THE PACE ON AIRCRAFT PRODUCTION

★ LOW TOOL COST! Standard Carboloy tools, available in 10 styles, 5 grades, wide range of sizes, are priced as low as 70c per tool.

IN the aircraft industry, on thousands of vital jobs, *STANDARD* Carboloy tools have set the pace on machining production! Cutting speeds stepped up as high as six times faster than with former tools! Tool life increased often as much as 20 to 1! Finish, on critical parts, so fine that 75% or more of hand-polishing time is eliminated! Close tolerances once believed "impossible" on mass production work, commonly obtained. Production of vital parts often doubled or tripled.

On aircraft manufacture—as well as in all other industries vital to war—*STANDARD* Carboloy tools have helped point the way towards new economies, new production peaks. These tools—at prices comparable to all other cutting tool materials—are available in 10 styles, 5 grades, for cutting *ALL* metals and non-metallics. Write for new catalog GT-175, just issued.

★ HIGH FINISH! On this steel gear, Carboloy tools produce a finish that eliminates 80% of former hand-polishing needed.

★ EXTRA TOOL LIFE! Machining steel gears for superchargers, Carboloy increases tool life 2800% on eleven operations.

★ INCREASED PRODUCTION! Simply by changing to Carboloy tools, in place of ordinary tools, 86% machining time was saved on this job.

★ EXTRA OPERATIONS ELIMINATED! Tooling with Carboloy Standards made possible the elimination of 4 stations on turret—total of 19 tools saved.

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CARBOLOY
TRADEMARK

For Cutting CAST IRON and Non-Ferrous Metals

For Cutting STEEL

TUNGSTEN CARBIDES ★★★ TUNGSTEN CARBIDES WITH TANTALUM AND/OR TITANIUM CARBIDES

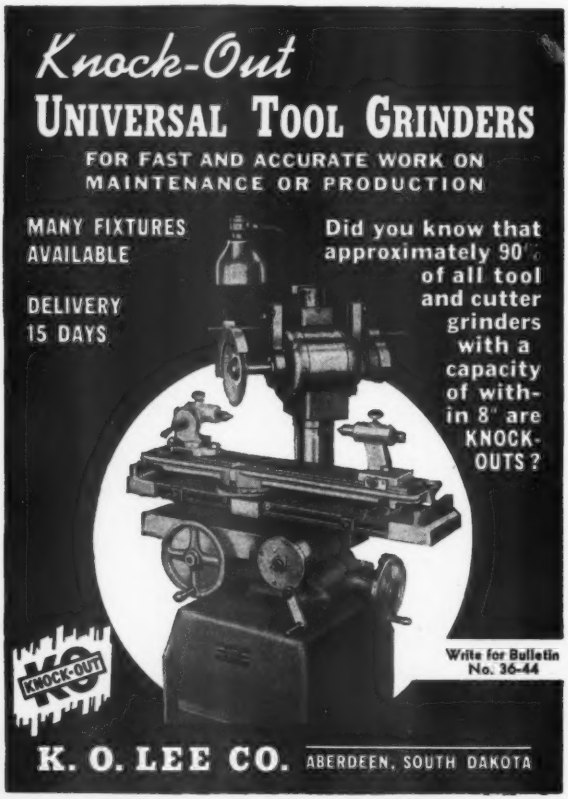
PREVIEWS

GUSHER COOLANT PUMPS, featured in a new 60-page catalog issued by RUTHMAN MACHINERY CO., Dept. TD, 1808 Reading Rd., Cincinnati 2, O., devotes each of the seven sections to a particular type or accessory of Pumps—immersed type; outside mounted, pipe connected; outside flange mounted type, external discharge; outside flange mounted; internal discharge; belt-driven models, shaft-driven type; plain drive attachments; mounting brackets and coolant tanks. Facsimiles of blue-print drawings, capacity in gpm, motor current characteristics and other valuable data are included. **318-J**

GRINDERS AND BUFFERS are illustrated in an interesting 20-page catalog recently issued by the QUEEN CITY MACHINE TOOL CO., Dept. T, 246 E. Second St., Cincinnati 2, Ohio. Representative types of Queen City Bench, Heavy Duty Box-Type, and Pedestal Grinders; combination buffers and grinders; heavy-duty buffers; and disc grinders are shown. These machines have a range of ⅛ hp to 10 hp in capacity. Complete specifications, prices and operating details of the various models are included. **888-J**

WORK ILLUMINATORS and Inspection Units which reduce worker fatigue and provide accurate inspection are detailed and illustrated in a 6-page folder published by the ACRO TOOL & DIE WKS., Dept. D, 4892 N. Clark St., Chicago, Ill. Equipped with fluorescent bulbs that give a soft, glareless light without heat or shadows, Acrolite inspection units provide what you need to insure proper inspection of small parts or minute surface characteristics. **595-J**

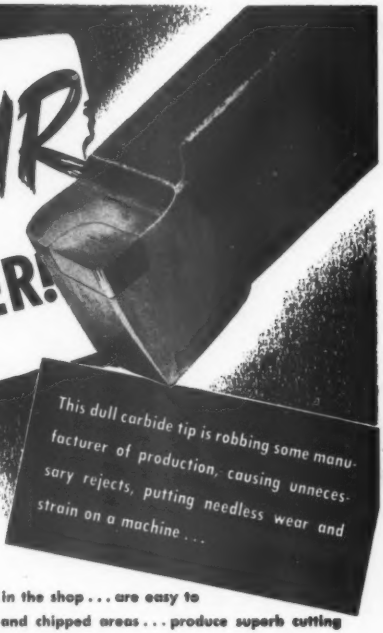
AIR-LUBE LUBRICATORS for automatic oil feed to Air Tools are the theme of a bulletin issued by FILTERS, INC., Dept. D, 1515 Gardena Ave., Glendale, Calif. These lightweight Air-Lube Lubricators in your air hoses or stationary installations will prevent "freezing" of air tools, reduce wearing of parts and eliminate the frequent delays and trips to the tool room for repairs. **292-J**


Knock-Out
UNIVERSAL TOOL GRINDERS
FOR FAST AND ACCURATE WORK ON MAINTENANCE OR PRODUCTION
MANY FIXTURES AVAILABLE
DELIVERY 15 DAYS
Did you know that approximately 90% of all tool and cutter grinders with a capacity of within 8" are KNOCK-OUTS?
KNOCK-OUT
Write for Bulletin No. 36-44
K. O. LEE CO. ABERDEEN, SOUTH DAKOTA

LAKE ERIE HYDRAULIC PRESSES—issued as Bulletin 341 by the LAKE ERIE ENGINEERING CORP., Dept. T, Buffalo 17, N. Y., is a condensed catalog illustrating the range of applications of Lake Erie high speed hydraulic presses. Single and double action presses, side plate, "C" frame, extrusion and compression molding presses are among the regular and special types of hydraulic presses shown. **353-J**

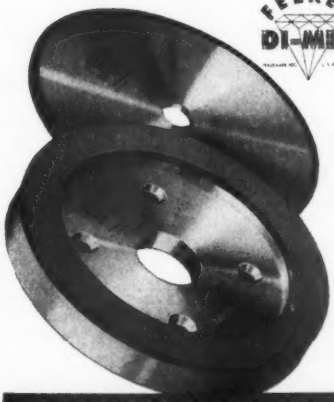
"PACKAGING PAYS OFF!" — Bulletin B6285 issued by the ALLIS-CHALMERS MFG. CO., Dept. J, Milwaukee 1, Wis., describes the Standardized Load Center Unit Substations made by this company. A total of 72 combinations of standard units from 100 to 2000 kva capacity to suit every type of installation is offered and the cost and time saving, ease of installation, flexibility and other advantages are pointed out. Construction features and engineering data are comprehensive. Send for your copy. **183-J**

NO SABOTEUR -but a SLACKER!



This dull carbide tip is robbing some manufacturer of production, causing unnecessary rejects, putting needless wear and strain on a machine . . .

There's no need for lost production from dull or broken carbide tools . . . or any necessity for sending them out for regrinding. DI-MET diamond wheels can generally be used on the high speed grinders in the shop . . . are easy to use . . . quickly remove broken or worn edges and chipped areas . . . produce superb cutting edges that can't be matched by use of ordinary abrasives!



FELKER DI-MET

DI-MET resinoid bonded diamond wheels will not craze carbide surfaces. They cut many times faster than silicon carbide—are highly economical because of their exceptionally long life and ability to hold size.

WRITE FOR THIS CATALOG—it provides many operating tips on using diamond wheels—shows the many DI-MET wheel sizes and types and gives prices and discounts.

ARMY-NAVY "E"

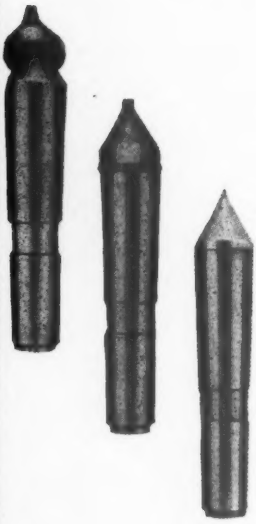
FELKER MANUFACTURING CO.
1111 BORDER AVENUE, TORRANCE, CALIFORNIA

MANUFACTURERS OF DIAMOND ABRASIVE WHEELS

Use COLMONOY

HARD FACING ALLOYS AND OVERLAY METALS

TIPS for Lathe and Grinder Centers Made of COLMONOY No. 6



In addition to supplying COLMONOY Center Tips, we are now in position to provide complete retipping service on centers.

This service consists of casting tips of COLOMONY NO. 6 and applying them to your centers by the use of Silver Solder or a low temperature brazing alloy. By the use of this method your worn or used high speed steel centers can be salvaged, and such reclaimed, COLOMONY tipped centers will outlast and outwear new, untipped centers.

Charges for this work are moderate. For full information, covering prices of tips as well as application by us, write for Bulletin CT-1.

OFFICES

Detroit, New York, Blasdell, N. Y., Chicago, Tulsa, Los Angeles, San Francisco and in Canada.

WRITE FOR LITERATURE

In addition to Bulletin CT-1, mentioned above, we shall be glad to send you our General Catalog No. 75, covering the complete line of Colomony Hard Facing Alloys, and illustrating typical applications.

WALL-COLMONOY CORP.

720 Fisher Bldg., Detroit 2, Michigan

SHOP AIDS

and BOOK REVIEWS

TOOL STEELS by J. P. Gill, Vice President and Chief Metallurgist, Vanadium-Alloys Steel Co., and R. S. Rose, G. A. Roberts, H. G. Johnstin, R. B. George, Metallurgical Staff, Vanadium-Alloys Steel Co.

This new book constitutes a complete handbook on tool steels and presents concisely both the theoretical and practical information that exists on the more commonly used types of tool steel. The presentation that is made of the available data on each steel is in the form of graphs and charts where possible. Much of the information in the field of tool steels has been published within the last ten or twelve years and to digest and correlate this information has been a task of no small magnitude. From the start of this important 577-page book with a comprehensive table of contents to the finish where fifty pages are devoted to painstaking cross-indexing and extensive bibliography, Tool Steels is packed with information for direct use in actual work. The book has been written mainly for those who use tool steels and it is predicated on the authors' hope that the data included will be of material help to tool steel users in becoming better acquainted with the many types of tool steels produced and in solving tool problems.

The sections on Manufacturing, Testing and on the Principles of Heat Treatment may prove somewhat elementary and have been included to establish a sound background for the more technical points and to enable the reader to properly evaluate the data presented elsewhere in the text. Every fact and practical operation is explained clearly and concisely and the range of the book is extremely broad and helpful. All types of tool steel testing, comparison of properties, methods and equipment for heat treatment and the use of alloying elements are covered. The most commonly used classifications of tool steels, die steels for hot and cold work, and high speed steels are all discussed.

Partial Contents: Manufacture of Tool Steel; Classification of Tool Steels; Testing of Tool Steels; General Properties and Selection of Tool Steels; General Principles of Heat Treatment of Tool Steels; Purpose and Effect of Alloying Elements on Tool Steels; Class 10, Carbon Tool Steels; Class 20, Chromium and Chromium-Vanadium Tool Steels; Class 30, Low Chromium-Nickel-Molybdenum and Manganese Steels; Class 40, Oil Hardening Non-Deforming Tool Steels; Class 50, Silicon Tool Steels; Class 60, Tungsten Finishing Steels; Class 70, Graphitic Steels; Class 510, Die Irons for Hobbing and Carburizing; Class 520, Low Alloy Tap Steels; Class 530, Non-Tempering Chisel Steels; Class 540, Tungsten Chisel Steels; Class 550, Wortle Die Steels and Self-Hardening Steels; Chromium Die Steels for Cold Work; Die Steels for Hot Work; High Speed Steels.

Published by American Society for Metals 7301 Euclid Ave., Cleveland 3, O., and priced at $6.00.

PRESS TOOL PRACTICE, by P. S. Houghton, A.M.I. Mech. E. Part I, 2nd Impression, 1943. This is Part I of a most comprehensive, 4 volume, treatment of each phase of press tool practice, and it deals with the work done on all classes of hand and power presses, single and double action. Starting with practices and methods that tend toward standardization of press parts the author takes up blanking tools with an unusual degree of thoroughness. All blanking tool requirements, calculations and performance characteristics are clearly explained with the aid of many detailed and well executed drawings. Forming and drawing, in both thick and thin metal, are treated with equal clarity and authenticity.

Contents: Standardization of The Machine And Equipment; Blanking Tools; Standards For Blanking Tools; Shear On Blanking Or Piercing Tools; Locating Stops; Raising Tools For Double-Action Presses; Standards For Raising Tools; Formation of Puckers; Cupping Tools For Double-Action Presses; Cut And Cupping Machines; Drawing On Double-Action Machines; Drawing On Single-Action Presses; Drawing Thin Material; Drawing Thick Material; Clipping Tools; Forming; Combination Tools.

Press Tool Practice is based on the author's

many years' experience as a mechanic, designer, manager, and later as a Works Director and visiting teacher in production engineering subjects at Aston Technical College, Birmingham. It covers knowledge acquired when producing goods for many trades; brass foundry to jewellery, domestic hollow-ware to heating electrical goods to typewriters, motor cars to aeroplanes.

Published by: Chapman & Hall Ltd., 11 Henrietta St., W. C. 2, London, England, and priced at $3.25.

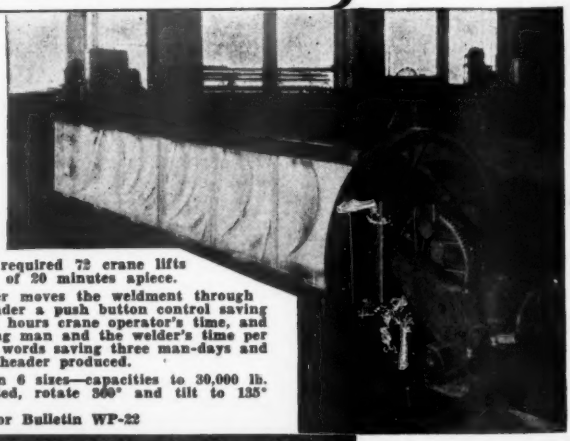
ILLUSTRATED TECHNICAL DICTIONARY, edited by Maxim Newmark. The plan of this dictionary, complete from abaca to zwitterion, is to supply a wide and representative selection of officially approved, standard definitions promulgated by various United States engineering, technical, trade and industrial organizations. In selecting, editing and compiling this material the number of terms included for any subject was determined on the basis of whether that subject is fundamental in all fields and whether it has current importance in the world of technology. Broad coverage has also been given to fields of current importance in the war effort as well as to all subjects listed in the Pre-Induction Outlines of the U. S. Office of Education, and priority has been accorded those terms likely to be encountered in the general curricula of technical and vocational schools. To enhance the usefulness of this dictionary in shop, school and library, various items of supplementary information have been included. Among these are tables of technical abbreviations, standards and measurements, mathematical, scientific, and technical symbols, conversion tables, shop data and formulas. Further data, including a complete interconversion table for the various temperature scales, tables of metric equivalents, and a table of the chemical elements, are conveniently arranged in the Appendix.

Published by: The Philosophical Library, Inc., 15 East 40th St., New York 16, N. Y., and priced at $5.00.

PRECISION MEASUREMENT IN THE METAL WORKING INDUSTRY—Volume 1, a new, revised edition of the manual on precision measurement and inspection methods prepared by the Department of Education of International Business Machines Corporation, has been published by Syracuse University Press, Syracuse 10, N. Y. Prepared originally for use in training IBM workers in high precision methods, the material has been used in arsenals, service schools, industrial and vocational schools. The new edition incorporates many suggestions made by those who used the earlier editions. The material covers seven chapters: Introduction to Measurement, Non-Precision Line-Graduated Measuring Instruments, Micrometer and Vernier Type Instruments, Precision Gage Blocks, Fixed Gages, Thread Gages and Dial Gages and Test Indicators. Each chapter is a study unit with "here's-how" photographs and review questions. Over 250 photographs, drawings and diagrams help make the text practical and clear. The presentation is progressive, making the manual not only an exceptionally fine learners' text but a practical reference source for the shop man who may not use

C-F POSITIONERS

Save 72 Lifts



The Norberg Manufacturing Co., Milwaukee, have eliminated 72 lifts per unit by using a C-F Positioner on the production job illustrated. These complex weldments (Scavenging air headers for large Diesel engines) have to be "procedure-welded" and formerly required 72 crane lifts which took an average of 20 minutes apiece.

Now, the C-F Positioner moves the weldment through the routine positions under a push button control saving 24 hours crane time, 24 hours crane operator's time, and the same of both a sling man and the welder's time per weldment . . . in other words saving three man-days and one crane-day on each header produced.

C-F Positioners come in 6 sizes—capacities to 30,000 lb. All are pedestal mounted, rotate 360° and tilt to 135° beyond horizontal.

Write for Bulletin WP-22

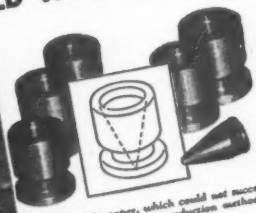
CULLEN-FRIESTEDT CO. 1316 S. Kilbourn Ave., Chicago 23 U S A

GORTON

SPECIALISTS FOR OVER 50 YEARS IN

Tracer-Controlled MILLING

How Tracer-Control SAVED 180 HOURS ON THIS PLASTIC MOLD WAR JOB



(Above) The taper, which could not successfully be generated by any other production method. Finished molded cone shown ½ size.

ONLY THE GORTON DUPLICATOR could solve this Massachusetts manufacturer's problem on the production of molds for tapered cones. Other production methods caused an unevenness of the cut which could not be polished out.

The Gorton Duplicator was equipped with a power-driven rotary table. A simple template, held in a vise, was used as a master. TRACER CONTROL—the tracer moving along this template—guided the special cutter having a taper identical to that of the cone.

The floor-to-floor time for roughing by previous methods was 11 hours. The Gorton Duplicator cut this time to 2 hours—a saving of 180 hours on the roughing of 20 molds—and produced an extremely fine finish. Both roughing and finishing operations were done on the Gorton Duplicator.

PRODUCTION DATA

Material—Tool Steel.
Operation—Duplicating Molds.
Feed—Manual.
Speed—Roughing 750 r.p.m.
Finishing 3600 r.p.m.
Time, Floor-to-Floor—Roughing 2 hours—Finishing 1 hour.

Use Gorton Free Engineering Service

Gorton Engineers invite you to submit any problem to be solved. For more than 50 years, Gorton Engineers have constantly added to a wealth of machining information in our performance record files. These records often contain the solution to a problem similar to yours. Submit prints or specifications through your nearest Gorton dealer, or direct to the Gorton factory at Racine, Wisconsin. There is no obligation.

The Right Size The Right Type of Machine for Every Job... From 2 oz. to 2 ton DIE BLOCKS

Tracer-Controlled MILLING

Tracer-Controlled DUPLICATING

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Tracer-Controlled ENGRAVING

GORTON Precision MACHINES

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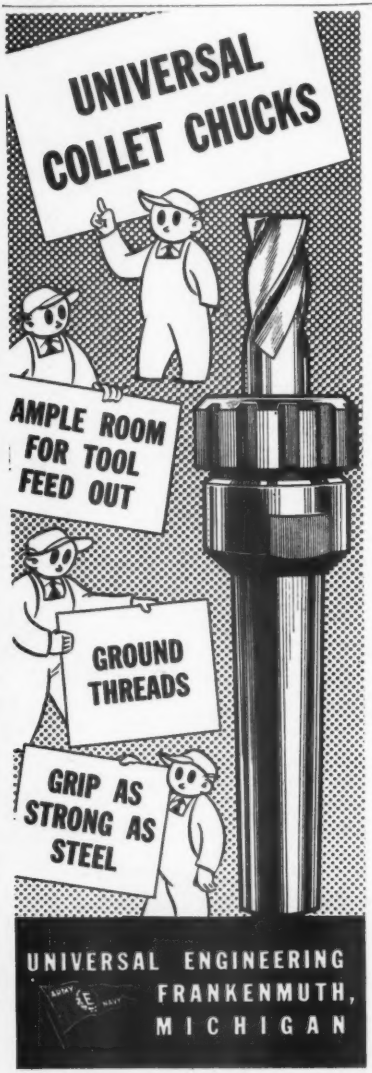
some precision measuring tools regularly. Volume 2, covering advanced types of measuring instruments and some of the latest methods of inspection, is in process of complete revision. It is expected to be ready for publication in a few months. Published by: Syracuse University Press, Syracuse 10, New York. Vol. 1, now available, is priced at $2.75.



"TIME STUDY ENGINEERING". This newest book in its field is characterized by its simplicity and ease of understanding. Written basically as a classroom text from the viewpoint of a methods engineer, it contains many suggestions of value to the foreman, supervisor or executive. It gives the ambitious operator complete information on achieving efficiency in his work. The book gives background data on shop production methods, machinery and tools as well as the step-by-step study that should be undertaken. Devoted entirely to metal working shop and production plant equipment and operations, it covers master time studies of operations on 13 types of machines, assemblies and finishing operations like spraying, enameling, cadmium and nickel plating. Group bonus and standard hours, budget control, motion analysis, determination of task and price and efficiency rating are treated in separate chapters. The chapter on process or flow charts and 23 time study charts, in a back cover pocket, round out an excellent first-book-to-be-consulted on the subject. Written by William H. Schutt, president Detroit Time Study School, Inc., the book is published by McGraw-Hill Book Co., Inc., 330 West 42nd Street, New York 18, N. Y., and is priced at $5.00.

DIAMOND WHEEL QUESTIONS AND ANSWERS—As the demand for Diamond Impregnated Metal-Bonded grinding wheels expands, the Larco Tool organization has experienced a marked increase in the number of questions received from every type of plant regarding these wheels. The requests for help and information have been so insistent that Larco experts have incorporated these questions with authoritative answers into a 32-page booklet. It is their opinion that this bulletin covers the most pertinent facts of Diamond Impregnated Grinding Wheels, i.e., recommended uses, economical operation, proper maintenance, etc. This booklet is available to plant executives and production men without charge. Write to Plant Service Dept., Larco Tools, 551 Fifth Ave., N. Y. 17, N. Y. **930-J**

KIRKSITE "A" is the title of a 16-page manual designed to give the reader a basic understanding of Kirksite "A", a zinc-base alloy, and its applications as a die metal. Altho published at a time when Kirksite "A", like most other metals, is primarily engaged in serving the needs of war industry, a special ruling by the War Production Board, currently in effect, permits the use of limited amounts of Kirksite "A" for certain experimental purposes, without priority. It is, therefore, the purpose of the booklet to give the reader certain facts about Kirksite "A" to help simplify his choice of a die metal for the production of light sheet metal, plastic, fibre, paper or composition parts and objects. The manual has a table showing the physical properties of this alloy compared with cast iron and sand-cast aluminum alloys. A brief history of the ac-

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List $45.00

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Order from your dealer or write us for literature.

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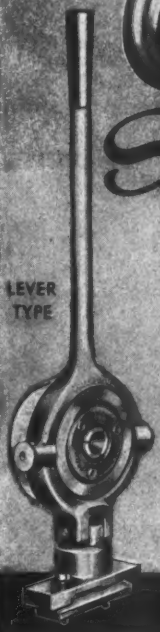
HAND DRAWBAR $18.50



LEVER TYPE

- Increases ½" collet capacity lathes to ¾".
- Ready for instant use and interchangeable on any 1½" x 8 thread spindle lathe . . . Atlas, Logan, 9" South Bend, Clausing, etc.
- Full Spindle Accuracy.
- LEVER TYPE for continuous production. Feather pressure releases work while lathe is running. LIST $79.50, Collet extra.
- HAND TYPE for use where quantity production is not required. Lathe must be stopped to open and close collet. LIST $19.75, Collet extra.

GENERAL DIE-STAMPING-TOOL COMPANY

PRECISION COLLET DIVISION 265 Canal Street, New York 13, N.Y.

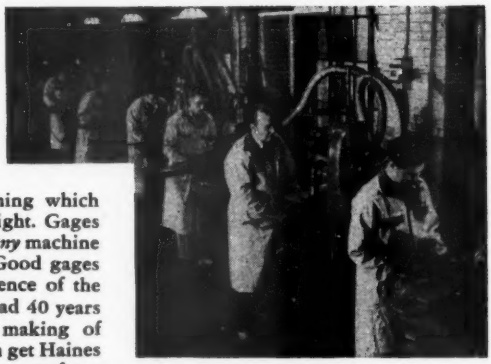
ceptance of Kirksite "A" by the aircraft industry is combined with an explanation of the performance characteristics of the alloy which enable it to meet the exacting requirements of aircraft production. The excellent casting properties of Kirksite "A" are now supplemented by the advantages inherent in Kirksite "A" in the form of rolled sheets. Relative to the technique of using the latter, the manual conveys enough information by text and photos of tools to enable a die designer to proceed on his own. Complete descriptions of these applications, however, fall in the category of confidential wartime information. In addition to the manual, two highly informative reprints are available: "Mass Production of Kirksite Blanking Dies", by W. W. Broughton of the National Lead Co., and "Impression-Cast Chuck Jaws", by H. F. Lenz, Chief Engineer, American Screw Products, Los Angeles. The latter article is a step-by-step story of the making of special chuck jaws for holding forged aircraft tubing fittings by casting Kirksite "A" about a sample forging and then finish machining the jaws out of the cast slug.

Write NATIONAL LEAD CO., Dept. TD, 111 Broadway, N. Y. C., and specify literature desired. **938-J**

DIAMOND DRESSING TOOLS—A most comprehensive and unusually convenient manual-catalog covering their Wheel Dressing Tools has been issued by the Industrial Diamond Company of Detroit. The catalog is of file drawer size and incorporates an index tab for ready reference. All styles of diamond dresser mountings are graphically illustrated and the specification pages include tables for determining best diamond tool size in terms of wheel diameters and face dimensions. Thoroughly covered by illustration, text and specifications are Industrial's single stone tools, multiple diamond dressers, "Diamite" cluster tools, diamond hones, diamond tools for thread grinders, diamond penetrators for hardness testing, gear grinding dressers and diamond form tools as well as special drilling, turning, boring and reaming tools. Following that portion of the catalog devoted to price lists are three pages that diagrammatically specify and price Industrial's Resinoid Bonded Diamond Wheels. This highly informative catalog is at the same time a valuable diamond tool reference for anyone having anything to do with diamond tools. It is obtainable from INDUSTRIAL DIAMOND CO., Dept. T, 7 Avalon Ave., Detroit, Mich. **937-J**

PRESENTATION of the Army-Navy E Award to the men and women of Admiral Corp., 3800 Cortland St., Chicago 47, Ill., has been announced. The presentation was made by Brig. Gen. Edgar L. Clewell, and was accepted by Ross D. Siragusa, president of Admiral.

What HAINES Gage Experience Means to YOU . . .



Gage manufacture is something which cannot be undertaken overnight. Gages cannot be produced on just *any* machine tool, by just *any* machinist. Good gages require the skill and experience of the gage specialist. Haines has had 40 years of sound tradition in the making of measuring devices. When you get Haines Gages, they're right. You can make a 60-second inspection of our plant by writing for our new bulletin. Get your copy. HAINES GAUGE CO., 2301 W. Allegheny Ave., Philadelphia 32, Pa.

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Just right for your small parts. Light in weight, easy to handle. Equipped with drop handle each end. Runners save wear on bottom of box and act as positive stacking lock.

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An ideal all-purpose shop box. Sturdy all-welded construction. Heavy skids act as positive stacking lock and re-inforce box at point of maximum wear.

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Open front makes contents easily accessible when boxes are stacked. Will stack with Style 600 boxes.

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Prices F.O.B. Factory, Philadelphia. Any Quantity

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APPLIED SAFETY ENGINEERING, by H. H. Berman, Safety Engineer, Consolidated Gas Electric Light and Power Company of Baltimore; Instructor in Safety Engineering, University of Maryland, and H. W. McCrone, Field Engineer, Baltimore Safety Council; Instructor in Safety Engineering, University of Maryland.

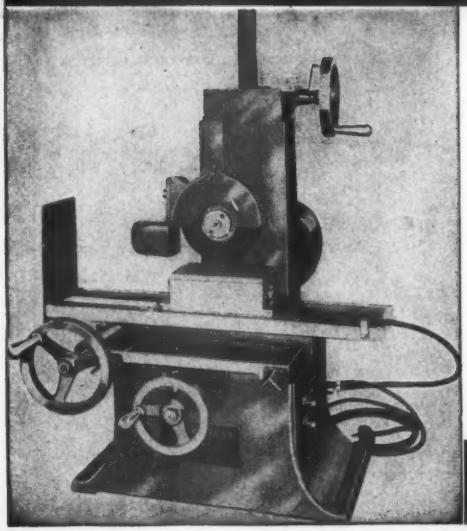
Industrial Safety Engineering has assumed national importance as a profession. With the public's attention focused on the annual accident toll and its impact on production, Safety Engineering Methods are under constant discussion and study. A consequence of the increased attention to the accident problem has been the demand for additional Safety Engineers. Paralleling this growing importance of industrial safety engineering, a need for a textbook or handbook on the subject has been evident for some time. Applied Safety Engineering is such a text, written by two Safety Engineers. The book defines the field of Safety Engineering and gives the humane and economic reasons for its importance, but the duties and qualifications of the Safety Engineer constitute by far the major portion of the subject matter. After several chapters on Safety procedure, investigations, and reports, six typical accident cases are considered. Each is reported in detail, with causes and recommended action. The following chapters on "Pattern Safety Rules and Regulations" present a complete development and study of each of these six cases and show how rulings are developed to obviate each type of accident. The chapters on Writing Safety Messages and Holding Safety Conferences are most valuable. The same six cases are further elaborated in these chapters from the standpoint of discussing each past accident with company employees in safety talks and meetings. The important topic, How to Make a Safety Inspection, is made the subject of the final chapter. Here will be found valuable suggestions for increasing the scope and effectiveness of safety inspections.

Published by McGraw-Hill Book Co., Inc., 330 West 42nd St., New York, N. Y., and priced at $2.00.

WARTIME DATA SUPPLEMENT to the American Machinists' Handbook, by Fred H. Colvin and Frank A. Stanley. The current war effort has occasioned many drastic changes as to new materials, material substitutions and in production and shop procedures. This 153-page supplement covers many such changes that have been proven effective in obtaining increased production in a variety of lines of work. Contents: Materials; Screw Threads; Drilling; Cutting Tools; Grinding Wheel Markings; Gearing; Forging, Forming, Punching, and Welding in Aircraft Work; Inspection; Metal-Cutting Saws.

Also published by McGraw-Hill Book Co., Inc. Price, $1.00.

Sanford precision bench surface grinder



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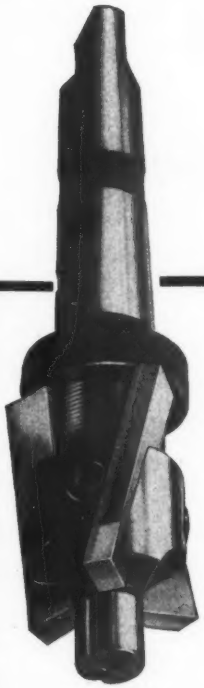

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Replaceable Blades — Interchangeable Pilots — Constant Chip Space

STANDARD SIZES FROM 1¼ TO 4 IN. IN DIAMETER

STYLE H tools are designed for heavy cuts where maximum stock removal is required.

STYLE F tools are recommended for light finishing cuts where a very smooth and accurate finish is required.

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Adjustable Hollow Mills and Special Production Tools

DIECASTING DIGEST

The "Slow-Squeeze" Injection Method

There are two general types of injection system for the pressure diecasting of non-ferrous alloys. One is the submerged plunger injection system for low melting point alloys such as lead, tin and zinc; the other is the cold-chamber injection system for high melting point alloys such as aluminum, brass and magnesium.

During recent years, excellent castings, comparatively free of porosity, have been produced by permanent molding—that is, by gravity pouring into heated metal dies. The casting was poured slowly, the metal flowing slowly from the bottom upward, thereby allowing the air and gases to escape ahead of the molten metal. Aluminum castings so made were superior to those made at high injection velocity on pressure diecasting machines.

Therefore, the best metal handling system for making structurally strong diecastings is the cold-chamber method of high pressure injection, with the slowest possible injection speed consistent with the rate of chilling of the molten metal and the thickness of the casting sections. This procedure, augmented by a high final pressure application or squeeze on the casting as it chills, constitutes the "slow-squeeze" injection method and produces the strongest castings.

These diecastings, 16" in diameter and weighing 9½ and 12 lbs. respectively, are being produced on a Lester-Phoenix HHP3X diecasting machine faster than ever before, and their total cost is 1/5 that of sandcast parts. Made by the "slow-squeeze" injection method, they are stronger and denser than ordinary diecastings, approaching forgings in physical characteristics.

LESTER-PHOENIX, INC.
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FREE
Send for this well-illustrated 8-page book on diecasting and diecasting equipment.

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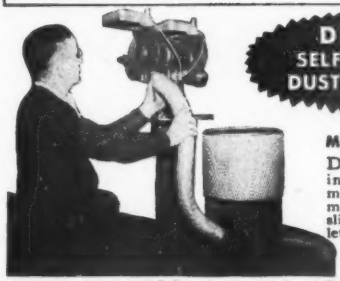
DIE CASTING MACHINES

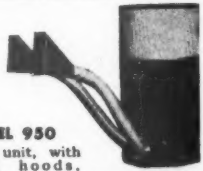
FREE DATA on DIECASTING

Write for your copy of Herbert Chase's "Factors to be Considered When Designing Diecastings"—Lester-Phoenix, Inc., 2625 Church Avenue, Cleveland 13, Ohio.

Quick way to STOP DUST!



DUSTKOP
SELF-CONTAINED
DUST COLLECTORS



MODEL 600
DUSTKOPS are installed in a few minutes. Flexible metal hose makes slip fit with dust outlets on grinder.

MODEL 950
This unit, with dust hoods, "ready to go," fits any double-end pedestal grinder not already equipped with wheel guards and dust outlets.

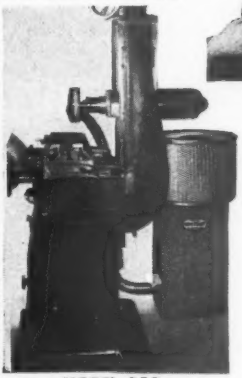
DUST STOPPED ON ALL ABRASIVE OPERATIONS AT LOWEST COST

MODEL 600
With flat, spun glass filter for compact bench installation. Pulls all dust from two grinder wheels.

For quick, economical, effective dust control *at the source*, install DUSTKOPS. Easy to attach to surface grinders, disc grinders, cutter and tool grinders, flexible shaft grinders—or to buffers, sanders and abrasive cut-offs—whether single or multiple units. Large or small models available.

DUSTKOPS are compact and portable. Entirely self contained, with motor, fan, cyclone separator (in all but smallest models) and spun glass filter. Flexible metal hose permits quick installation.

DUSTKOPS clean the dust-laden air without wasting heat. Efficient cyclone separator provides low maintenance. Many other features make DUSTKOPS ideal for your shop or laboratory. Immediate shipment of "standard" voltage units.



MODEL 950—has cyclone separator, plus spun glass filter. For medium duty work of all kinds.

MODEL 1250—gets all dust and smoke from this heavy duty abrasive cut-off, at extremely low cost.

MODEL 950—with cyclone separator means low first cost, low maintenance, even on production surface grinder.

(Left)
MODEL 1250—one unit handles dust from four wheels.

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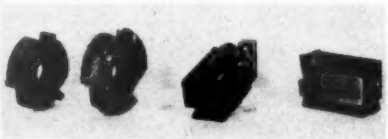
Reclaiming Unused as Well as Used High Speed Tools

Reclaiming unused tools by torch brazing cemented carbide tips to high speed steel cutting surfaces is a logical practice according to Yale and Towne of Stamford, Conn. The necessity of conserving vital materials led this company, like others, into the practice of reclaiming and salvaging all high speed tools whenever possible by this method. The success in increasing so many times the life expectancy of tools led logically to "reclaiming" unused high speed cutting tools.



Circular form tools (left). Halves of tips were brazed on unused tools; form cutters (right), tips ground to form of the shank.

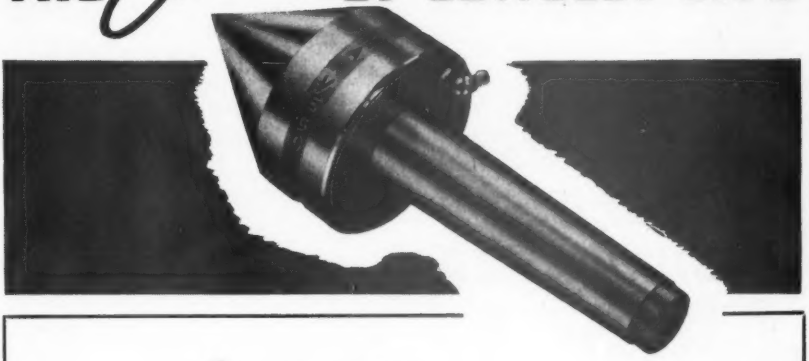
An example of reclaiming an unused tool is illustrated at the left in Fig. 1. A circular form tool is shown tipped and finish ground. The standard carbide tips are cut in half with a diamond cutoff wheel; the halves are torch brazed to the tool face; the tip is then ground to the shape of the body. By contrast, the form cutters shown at the right in Fig. 1 were salvaged by brazing on standard carbide tips and grinding them to the form of the shank. The excess carbide from the oversize tip is also salvaged and used for tipping smaller tools.

Another high speed tool, worn undersize, was salvaged by tipping as shown in Fig. 2, again using standard carbide tips. After tipping, the OD is ground to the original tool size, resulting in a tool with a longer life expectancy than that of the original tool.

The broach shown in Fig. 3 is an unusual carbide salvage job. The original high speed broach is shown at the right. When the broach wore out, every other tooth was removed and the balance tipped with carbide. Standard tips were

(TO PAGE 162—PLEASE)

THE *Center* OF LONGEST LIFE



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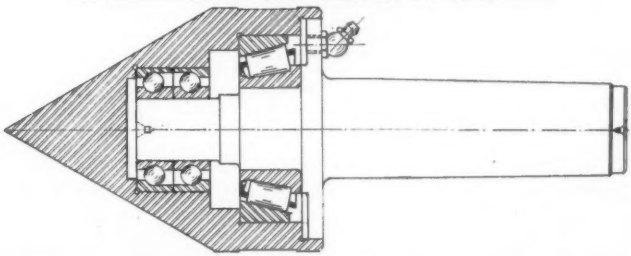
The Marveco Live Center (formerly Marvel) retains the same features and patented construction — a combination of precision Taper Roller and Ball Bearings with a completely automatic adjustment for wear — that makes possible the guarantee that Marveco will outperform any other live center.

Its ability to hold limits indefinitely makes the Marveco one of the very few live centers to be recommended for grinders. A pair of Marvecos when checked recently had run for eleven months on a 20mm gun barrel with runouts of .0001″ and .0002″.

The Marveco's ability to stand heavy loads and high speeds is a proven answer to the adaptation of Carbide cutting tools in the modern plant.

The New Marveco Live Center Catalog will be sent on request.

CUTAWAY VIEW SHOWING MARVECO CONSTRUCTION



You get these results with Marveco: 1. Unheard of accuracy; 2. Elimination of chatter, center regrinds and scrap due to inaccurate or worn centers; 3. Undivided attention of operator to work; 4. Increased production due to heavier cuts obtainable with the Marveco.

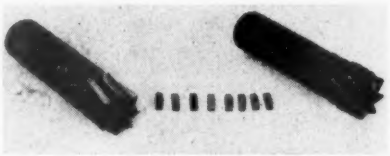
MARVEL TOOL & MACHINE COMPANY

10973 W. Jefferson Ave. :-: River Rouge 18, Michigan

(CONTINUED FROM PAGE 160)

used and located in staggered arrangement on the broach. The salvaged broach is shown at the left, while the part which it machines is shown with the original broach at the right.

Striking performance results were obtained with this tool. Previously, the broach had to be honed and burnished after about 500 to 700 pieces. After about 1000 pieces the broaches were "worn out". After salvaging, the number of teeth was reduced from an original 42 to only 10 side teeth and 13 top teeth. Yet the salvaged broaches are producing around 15,000 pieces. When worn undersize again, the broach can then be resized by moving out the tips or by brazing on new tips.

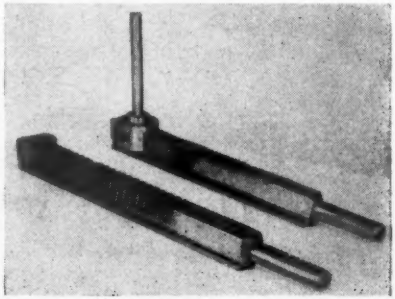


A salvaged cutter, the carbide tip OD ground to original tool size.

These applications could be, and have been, duplicated and extended in scores of shops and production plants. Carbide tipping may be as practical on unused as on worn tools.

In an engineering analysis it is evident that there are a number of advantages in the employment of carbide tips on high speed tools—the salvage possibilities, the freeing of skilled workers and grinding equipment for other work, economical utilization of high speed steel and greatly increased production per grind and prolonged tool life. These factors, particularly the latter, mean less down time and add up to satisfy the most critical requirement of all—more units per hour, every hour until victory is won.

Original broach (right) with work part; salvaged broach (left) with inserted staggered carbide tips.



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AEROMAC CUTTERS
with CARBOLOY TIPS
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LOOKING for new production speed and efficiency in your milling operations involving steel, cast iron, non-ferrous and other materials? These skillfully designed Aeromac tools are ready to tackle your assignments — with proven accuracy and economy.

Built with genuine Carboloy tips, the performance of these cutters is limited only by the capacity of the machine on which they are used. Yet this high production speed is obtained without any sacrifice in precision.

Thanks to super-hardness of Carboloy tips, the surface finish obtained is unusually smooth as shown by recognized surface analysis methods. By wearing longer, these Aeromac Cutters bring new economy to practically all types of milling operations.

Available in a standard range of sizes and types. Put a few on a "test run" in your plant. Check their performance and low cost! Engineering data on request.

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Aeronautical Manufacturing Corporation

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★ Manufacturers of Control Valves, Precision Gauges, Production Tools and Machined Parts for the Aircraft Industries ★

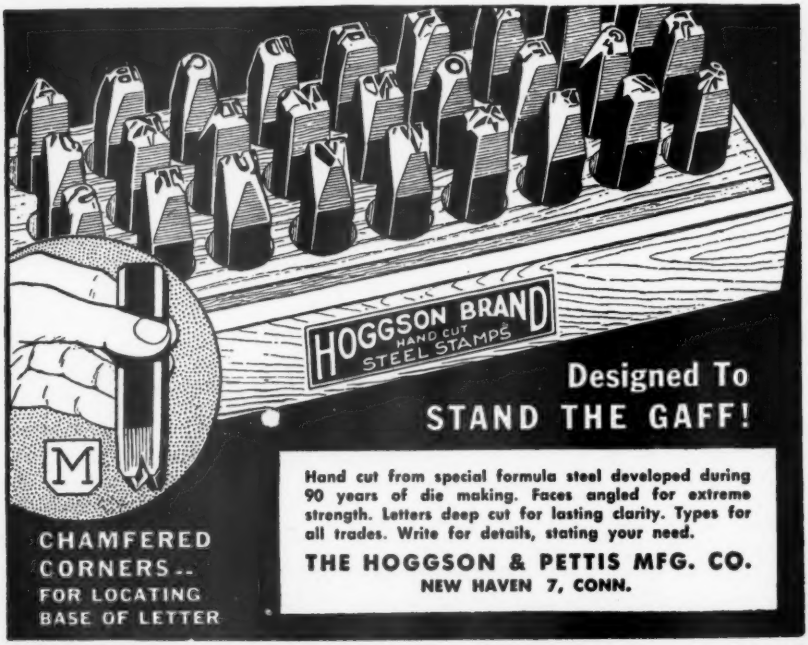
Compressed Air For Operating Forge Hammers

The Educational Committee of the Compressed Air Institute has released a circular on the subject "Compressed Air For Operating Forge Hammers" which digests the factors that determine when compressed air applications are practical in forge shops. A number of points covering a practical engineering survey of forge shop requirements are listed. Copies of this circular may be obtained from the Educational Committee, Compressed Air Institute, 2108 Terminal Tower, Cleveland, Ohio.

"Electrical Developments of 1943"

"Electrical Developments of 1943", the General Electric Company's annual review, despite restrictions on publicizing so many new developments that have a bearing on national security, is still an impressive recital of what this company has achieved both in military and non-military fields during the year. Seven sections treat briefly of war equipment, power generation, transmission and distribution, industrial equipment applications, transportation, radio and lighting, testing and measuring and research. Under war equipment one of the most interesting developments described is an optical rifle-sighting gage which permits precision alignment of the front and rear sights on service rifles quickly by substituting lightbeams for rounds of ammunition. Industrial equipment applications include amplidyne motors and generators, automatic quenching in pusher-type furnaces, box furnaces for hardening, electronically actuated plastics heaters, materials handling controls, and steel mill operations. In transportation, leading applications are amplidyne drive and control on the Martin and Grumman turrets, a new electric-hydraulic automatic pilot system, four electrically driven gyroscopes, turbine-electric propulsion sets for the new destroyer escort and two diesel-electric

(TO PAGE 166—PLEASE)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Hand cut from special formula steel developed during 90 years of die making. Faces angled for extreme strength. Letters deep cut for lasting clarity. Types for all trades. Write for details, stating your need.
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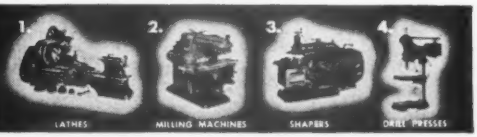
Precision Paves the Way to Tokyo

Sharper shooting . . . closer bombing . . . greater speed—that's our edge on the Nips! And the precision that makes it possible begins on American production lines where less than a thousandth of an inch is a sacred thing to Uncle Sam's crack machinists.

In production plants throughout the country and in the mobile machine shops of our armed forces, Atlas machine tools are helping make and keep our fighting weapons on top. The Bench Milling Machine is one of the Atlas tools for small parts work to relieve large machines for larger jobs in plant after plant. This compact modern tool handles all milling operations with split-hair precision.

Speeding production for quicker Victory, the Atlas 4 Tool Team will be a potent profit-making combination after the war. Put it to work boosting production now . . . use it for quick conversion later! Write for full details and address of our nearest representative. ATLAS PRESS COMPANY, 412 North Pitcher Street, Kalamazoo 13D, Michigan.

4 Atlas TOOL TEAM FOR SMALL-PARTS MACHINING



(FROM PAGE 164)

locomotives—one a modification of the standard 44-ton, the other a 75-ton locomotive, the latter for Army use in foreign theaters. A new 160 kvp industrial X-ray fluoroscopic unit for inspecting light alloy castings, a new electronic tachometer and many other new developments are briefly outlined.

Magnesium Fabricators Form Association

Representative members of companies engaged in the fabrication of magnesium and its alloys have formed the Magnesium Association. The announced aim of the Magnesium Association is "to promote the general welfare of the magnesium industry, of the members of the Association, and all others affected thereby, and to develop and increase the use and acceptance of magnesium and its products". The Association is expected to contribute materially in the establishment of magnesium as a postwar industry. The announcement of the formation of the new association states that more than one hundred companies are now engaged in the fabrication of magnesium and its alloys, taking the form of drawing, forging, rolling, extruding, sand casting, permanent mold and die casting and powder manufacture. Edward S. Christiansen, vice president of Apex Smelting Company, was elected president of the new Association. C. C. Loomis, president of the New England Lime Co., was elected vice president and C. E. Larson, operations manager of the White Metal Rolling and Stamping Company, treasurer.

Postwar Employment and the Settlement of Terminated War Contracts

The research committee of the Committee for Economic Development, an independent, non-political corporation of American businessmen, has published a statement on "Postwar Employment and the Settlement of Terminated Contracts". Based on a careful and intensive study of the subject, it contains an outline of legislation recommended to supplement and simplify existing pro-

(TO PAGE 168—PLEASE)

BARTELT
NEW MODEL "C" PEDESTAL INDICATOR

Specially designed for accurately resetting precision boring bar tools, and for similar work. The upright has a vee base, with flats for working off a plane surface. The indicator, reading to ten-thousandths of an inch, has an adjustment of 1" along the slot in which it is clamped. This gage is intended for fixed setting to check precision tools on production jobs, and thus speed up resetting of tools after replacement or resharpening.

Write for new Circular

Showing all models, "A", "B", and "C", of Bartelt Pedestal Micrometers and Pedestal Indicators together with specifications and list prices.

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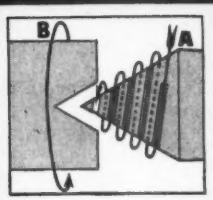
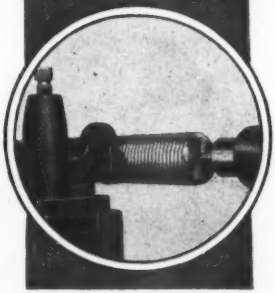
Helical Groove CENTERS



Arrow A shows flow of lubricant around helical groove.



CMD CENTER POINT OIL

When CMD Helical Groove Centers are used with CMD Center Point Oil, they can be drawn up tight against the work, permitting closer tolerances and finer precision results. Send coupon now for details and FREE sample kit of the oil.

Heat, generated in work by cutting tools, is expelled more rapidly by the CMD Helical Groove Center. Its exclusive left-hand helical groove lubricates the entire bearing surface of the work and the center. Additional lubricant can be added without stopping the machine. No dripping or crushing out of the lubricant. Expansion of the work is kept at a minimum. For faster production, specify CMD Helical Groove Centers!

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Send circular on CMD Helical Groove Centers.

Without obligation to us, send FREE sample kit containing a tube of CMD CENTER POINT OIL and a tube of CMD CENTER POINT LUBE (grease) with directions for making an amazing, simple test.

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(FROM PAGE 166)

cedures for the settlement of terminated contracts. Briefly, the recommendations include: the creation by Congress of a Contract Settlement Board whose function would be policy and procedure setting; a delegation of authority to contracting agencies to make final settlements; the enactment of legislation to establish a clear and simple avenue to the courts for all contractors and legal machinery for expeditious handling of such disputes; and the right of contractors and sub-contractors to obtain mandatory loans from the government in amounts equal to a substantial proportion of proper settlement claims.

Cooper-Bessemer Casting Scrap Less Than ½ of One Percent

A scrappage of machine tool castings at customers' plants substantially below one-half of one percent is the record recently announced by The Cooper-Bessemer Corporation, Mount Vernon, Ohio. In releasing the information, L. F. Williams, a director of the company, states that the report covered a four-year period and was based on a production of over 20,000 tons of a wide variety of castings ranging from machinery frames of 30 tons to tool accessories and machine tool elements. Meehanite, used for all castings, plus improved foundry techniques, are credited for this outstanding record. The dense, close-grained structure of Meehanite lends itself particularly well to many types of cast items; tests having proven its exceptional strength, machinability and wear-resistance. Cooper-Bessemer, who also operate a second foundry and engine building plant at Grove City, Pa., are exclusive licensees for Meehanite in the heavy Diesel field. This metal is used in all castings in their Diesel engines and compressors. The company has received wide recognition for their development of cast Meehanite crankshafts for replacing critical steel.

"Training Teamwork", the latest bulletin issued by the Apprentice Training Service of the War Manpower Commis-

(TO PAGE 170—PLEASE)

FOR CLOSER TOLERANCES IN
Precision DRILLING

USE *ACME DRILL JIG BUSHINGS*

★ Close tolerances, precision drilling and other rigid specifications must be adhered to in the manufacture of critical war products. And Acme has been helping war industries to meet these requirements by supplying drill jig bushings that assure accurate location of drilled holes.

Wartime demands, however, required no change in manufacturing methods at Acme. The same standards of precision that existed prior to the war prevail today. And during peacetime, Acme bushings will continue to serve industry efficiently in the manufacture of post-war products.

In war or peace, make Acme your bushing headquarters.

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HASKINS
Flexible Shaft
EQUIPMENT
More VERSATILE Machines for
More PROFITABLE Work

(FROM PAGE 168)

sion, outlines reports of four representative companies where labor-management committees have developed highly satisfactory techniques and achieved outstanding results. A second part of the bulletin traces briefly the growth of joint participation in industrial training. The bulletin concludes with a list of bulletins and manuals previously issued by the Apprentice Training Service. "Training Teamwork" will be sent on requests made to Apprentice Training Service, WMC Bldg., 1778 Pennsylvania Ave., N. W., Washington 25, D. C.

"Training Teamwork"

The manner in which technical advisory service is made available to small manufacturing plants producing both war and essential civilian goods is explained in a booklet issued by the Smaller War Plants Corporation, HOLC Bldg., First and Indiana Aves., Washington 25, D. C. A booklet, "Are You a Small Manufacturer Suffering from Production Headaches?" describes the organization of the Technical Advisory Committee and the Cooperative Plan by which the small manufacturer may receive assistance without cost. The booklet also outlines procedure through which small plants may obtain evaluation of and access to patents held by the Alien Property Custodian. A list of SWPC Field Offices is included.

"Are You A Small Manufacturer . . ?"

The Westinghouse Electric and Manufacturing Company, Mansfield, Ohio, recently released a study of postwar demand for fourteen appliances of which it is a maker. Data was collected from one hundred wholesale distributors of the company. The consensus of opinion was that the demand will be 50% better over an average of the first five years after victory and that this increase will represent a 78% distribution increase over the 1940 and 1941 averages.

Westinghouse Looks to the Future

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A 5/8" WILL DO IT--

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CHICAGO "SAFETY PLUS" Products, because of their uniformly high tensile strength may be substituted for other standard screws with many resultant advantages.

CHICAGO "SAFETY PLUS" Socket Head Cap Screws of a given diameter can be specified instead of hexagon head or fillister head cap screws of larger diameters. A 5/8" diameter CHICAGO "SAFETY PLUS" Socket Head Cap Screw, for example, is more than 38% stronger than a 3/4" diameter standard hexagon head or fillister head cap screw.

The complete line of Chicago "SafetyPlus" SocketProductsincludes Socket Head Cap Screws, Socket Set Screws, Pipe Plugs, Stripper Bolts and Square Head Set Screws.

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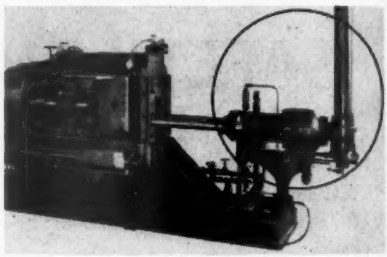
"Slow Squeeze" Die Casting

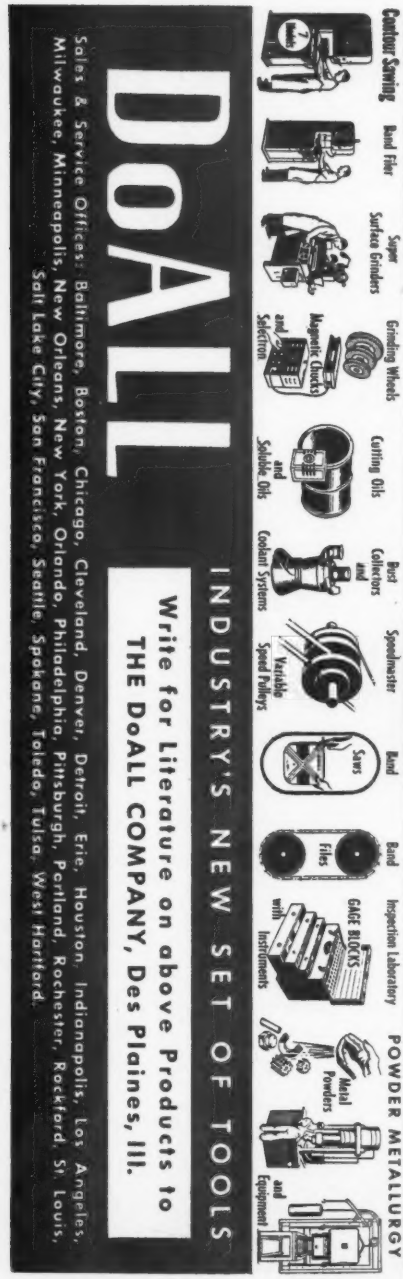
A new "slow squeeze" or pre-fill injection system which eliminates hydraulic accumulators on die casting machines and makes possible the production of aluminum, brass and magnesium die castings that are relatively free of porosity has been designed by Lester Engineering Company for Lester-Phoenix, 2625 Church Ave., Cleveland 13, Ohio. The new equipment is available as optional equipment for Lester-Phoenix high-pressure, cold chamber, die casting machines.

By eliminating the necessity for the use of a high-pressure hydraulic accumulator bottle, the danger of explosion from the oxygen content of compressed air is removed. The expense of the alternate method of overcoming the oxygen hazard by recharging with nitrogen is also thereby eliminated.



The molten metal (under high pressure) is injected into the die slowly. This allows the gas and air to escape ahead of it. After the die cavities are filled the pressure is maintained while the metal chills in the mold which prevents shrinkage voids and results in denser and stronger castings. Both the initial velocity with which the metal is introduced into the mold and the pressure under which it is held while solidifying can be held constantly uniform since they result from a solid column of oil under sustained pump pressure.

With the development of this new hydraulic design die castings can now be produced having physical properties that make them suitable for applications involving critical stress loading thus opening new uses for die castings. 425-J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Magnetic Chucks and Selectron
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Speedmaster
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HERMAN

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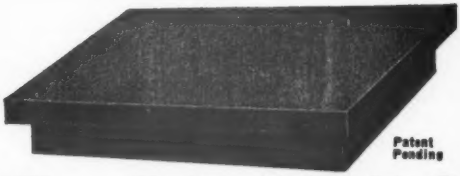

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Herman PRECISION GRANITE Surface Plates eliminate once and for all the disadvantages and uncertainties of old-fashioned metal surface plates. Cut from solid granite, they cannot warp and will remain accurate to 1/10,000 inch overall. Practically non-porous, they do not become charged with tool damaging abrasive particles. Corrosion and rust-proof, they are as nearly indestructible as man and nature can make them. Already scores of shops throughout the country have declared them unequaled for precision work. Let Herman PRECISION GRANITE Surface Plates increase production efficiency and economy in your shop. Write today for information.

STANDARD SIZES and WEIGHTS

12" x 18" — 75 lbs.	20" x 30" — 275 lbs.
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for Better, More Durable Weapons of War

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5418 Lakeside Avenue CLEVELAND, OHIO Phone HEnderson 9100

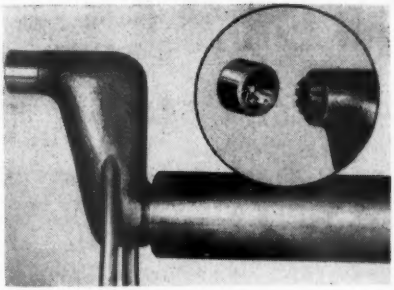
Offset Design for Electrode Tip Cooling

Designed for tip cooling when spot welding in hard to get to positions, e. g., spots close to flanges, the newly designed Frostrode offset electrode has a "solid" cross section at the point of greatest stress.

The knee of a standard offset electrode is often weakened by the internal water passages extending to the tip. In the Frostrode offset the cooling liquid enters below the knee and flows through the coolant guide into a finned, replaceable "Frostrode" which forms the electrode's tip.

The function of the coolant guide is to concentrate the cooling action of the fluid at the very tip of the electrode. A controlled flow of the cooling medium circulates through the finned cap and then back through the flutes which have been machined into the outer diameter of the coolant guide.

Advantages of a refrigerant over tap water for cooling these electrodes are stated by the manufacturer as: increase in output speed; considerable reduction in electrode pick-up; and decrease in down-time for electrode cleaning.



Frostrode offset electrode installed in a standard electrode holder. The inset shows the replaceable Frostcap and internal coolant guide.

For additional information and specifications of Frostrode Offset Electrode, address Frostrode Products, 19003 John R St., Detroit 3, Mich. 66-J

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PROTECTS
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The tough, resilient, coiled rawhide faces of C/R Hammers and Mallets strike effective blows without battering or marring... protects finished surfaces, machines delicate insulation and parts. Speed die-setting, assembly, no fatiguing re-coil. Reduce breakage and spoilage. Sizes and weights for every need.
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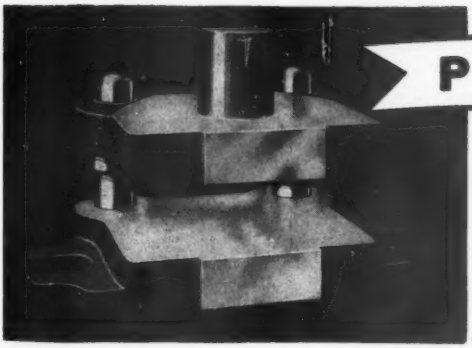

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PRODUCTO

Producto Die Sets available for shipment from our factories in Bridgeport, Connecticut and Detroit, Michigan; also from assembly plants—The Producto Company, Inc., 139 West 16th Street, Indianapolis, Indiana—Die Supply Company, 4747 Hough Avenue, Cleveland, Ohio—Jamison Steel Corporation, 2168 E. Olympic Boulevard, Los Angeles, California.

Die Makers' Accessories—Dowel Pins, Socket Screws, Stripper Bolts, Die Springs—in stock at above plants.

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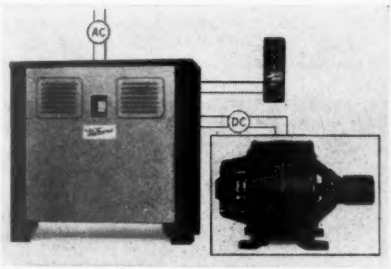
Adjustable Speed Drive Control for D-C Motors

A new line of "package" Weltronic adjustable speed drive controls for any machine driven by a D-C shunt motor from A-C power is announced by Weltronic Company, Detroit, Mich. The new package units, by eliminating the need for special design motors required by conventional motor controls, permits quick, easy installation for the control of new machines with stock motors or operating machines powered by standard D-C shunt motors.

Electronic rectifier tubes are employed in the Weltronic system to convert A-C to D-C supplying separate power to the D-C motor armature and field circuits. Each circuit is individually controlled through other electronic tubes to provide speed adjustment and current regulation. The method used to control



armature current prevents excessive current ripples, characteristic of conventional electronic motor controls. Full field strength of the motor and limited armature current is utilized in starting in order that maximum torque may be had without causing excessive power line surges and interference with other equipment with the same power source.

Full torque can be provided even at the lowest speeds making it possible to vary the speed of a machine without sacrificing torque. Complete stepless control of motor speed is obtained from a few rpm to double basic motor speed by a dial setting. Dial adjustment may be made while the motor is operating or it may be preset before starting. The motor accelerates at constant current to a selected speed at an adjust-

(TO PAGE 184—PLEASE)

Accelerating WAR PRODUCTION

Speed your output with Criterion Diamond Tools. The kind of service they give is responsible for the swift, steady increase in their use. Quality of diamonds employed plus a unique method of setting assure extreme rigidity and extra tool life. Special tools made to order following blueprints or specifications. Sharppointed, selected thread grinding tools. Ask your dealer or order direct. Request free literature.

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FOR MECHANICS' BUSY FINGERS

Knurled Unbrako Socket Cap Screws

Fingers gear right to the *knurling*. This prevents slipping and lost motion and naturally *saves time—speeds assembly*. Knurling also permits locking of "Unbrako" Socket Caps—we'll gladly tell you how. Sizes: No. 4 to 1½" diameter. Send for the "Unbrako" catalog today.

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Reg. U. S. Pat. Off.

Knurling of Socket Screws originated with "Unbrako" years ago.

OVER 40 YEARS IN BUSINESS

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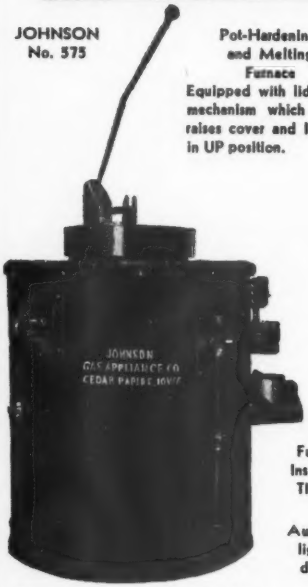
JOHNSON
FURNACES

DELIVERED IN
ONE WEEK

JOHNSON
No. 575

Pot-Hardening and Melting Furnace
Equipped with lid-lifting mechanism which easily raises cover and locks it in UP position.



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Automatic lighting device

Here's a pot-hardening furnace you'll agree is tops! Economical to operate, as a large blower insures maximum performance. Burners located near top of combustion chamber to add to pot life. Steel pot 14" wide, 20" deep. $400 F.O.B. Factory.

Also available with pots 14 x 18 and 14 x 16.

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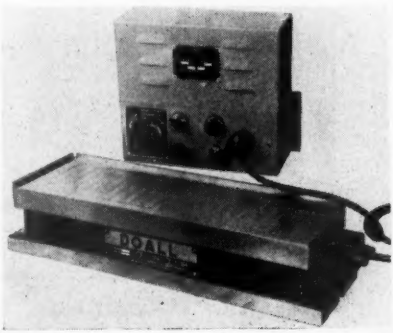
DoAll Selectron and Chuck

Two new products, the DoAll Electromagnetic Chuck and the DoAll Selectron, a rectifying and demagnetizing unit, are announced by Continental Machines, Inc. The Selectron controls the flow of magnetic pull in the chuck and demagnetizes the chuck when the work is to be removed. The new DoAll Chuck is made of high permeability cast steel and provides a maximum of holding power with minimum current consumption. Pole pieces are wound with plastics insulated wire of high dielectric strength and a special insulation compound is poured around the pole pieces to facilitate rapid dissipation of heat. This feature eliminates the danger of distortion and warping of the working surface of the chuck. The insulation also seals the chucks against damage by a coolant. As all parts are ground before assembly to assure positive contact between the elements of the magnetic circuit, there are no air gaps to waste power.

Work surfaces of the DoAll chucks are ground to mirror finish with sides and ends square and parallel so that they form a base to align the work piece when using the adjustable stop plates on the side and end of the chuck.

The DoAll Selectron utilizes electronic tubes for full wave rectification of alternating current when supplying direct current to the chucks.

For specifications address Continental Machines, Inc., 1303 S. Washington Ave., Minneapolis 4, Minn. 696-J



NEW... Acro NEEDLE EYE LAPS For Small Diameters

Exclusive Barrel-Shaped Lap Prevents Bell-Mouthing

★ Small holes, straight or tapered, can now be more accurately finished with Acro Needle Eye Laps. These new tested and proven "slit" laps finish any small hole with a total elimination of bell-mouthing commonly caused by split-end laps. Like the eye in a needle, the slit is supported at both ends by solid metal and can be spread to meet size requirements. No freezing against the work.

Needle Eye Laps will finish holes from .060" to .075" diameters. Special expander for spreading slot is included with each shipment. Laps come in eight sizes. Each can be expanded to meet next larger size. Packed in *dozen lots only.*

REMEMBER — it's the *barrel-shaped* closed end SLIT lap that eliminates bell-mouthing.

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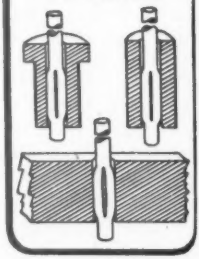

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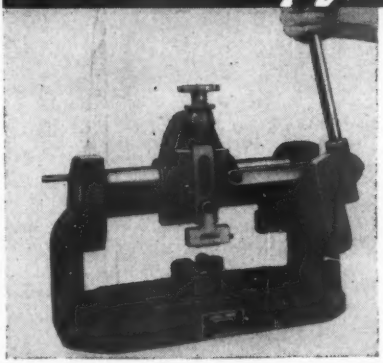

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The No. 9A ACROMARK Marking Machines are especially suited for shells, shot, tubular and cylindrical parts and pieces, including taps, drills, end mills, machine parts, and other components where neat, fast marking is essential. Operation is simple and easy. At a pull of the lever, a uniform mark of any desired depth is made, and another part is marked on the return stroke.

When volume production is required, the motorized No. 9AM Machine is used. This unit can operate at any set speed to suit the operator.

Special machines for any size or production need can be built to specification. Inquiries invited.

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THE ONLY MILL WITH BUILT-IN MICROMETER DIAL ADJUSTMENT

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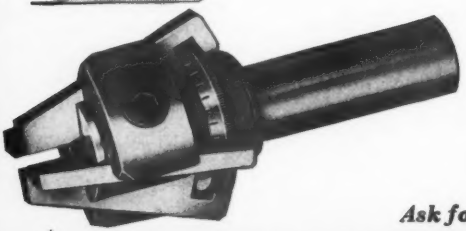

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Our large and complete stock insures immediate shipment.

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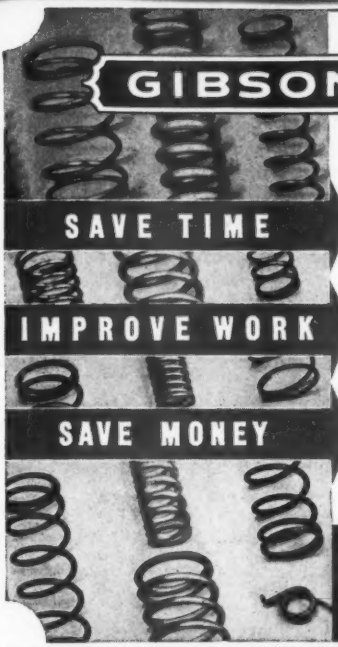

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SAVE MONEY

● Their exceptional quality and uniformity eliminate need for much of the usual tinkering, testing, equalizing or adjusting pressures when assembling or servicing the mechanism.

● Designed and made to deliver exactly the right pressure at the right spot, they make possible better work with less spoilage—and uninterrupted production.

● Lasting longer, saving time, saving spoilage, their use cuts costs. Also, advanced spring design often makes possible savings in size, weight and cost of other parts as well.

Your inquiries invited

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EXTRA STRENGTH

Can Save Time and Labor

When three screws can do the work of four, five or more, they save drilling, tapping and assembling time and labor. They speed production and cut costs.

Mac-it Hexagon Head Cap Screws are heat-treated for maximum strength and toughness. This extra strength can be used to provide ample holding power with fewer screws.

The Mac-it "m" on the hex head is your guarantee of quality. It appears on all diameters ¼" to ¾", inclusive.

OTHER MAC-IT PRODUCTS INCLUDE:

Hexagon Socket Cap Screws, Hollow Set Screws
Hollow Pipe Plugs, Stripper Bolts
Square Head Set Screws

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PRONOUNCED "MACK-IT"

Strong, Carlisle & Hammond Company • Cleveland, Ohio

Get maximum production from lathes, screw machines, punch presses, shapers and other equipment now belt driven from shafts, by modernizing with CULLMAN Motor Drives.

You can increase machine output 25% through greater flexibility, instant control, and belt drive smoothness. You can install CULLMAN Motor Drive in a few hours. On most machines only four bolts are necessary. CULLMAN Motor Drives are made for motors ranging from ¼ to 15 H. P.

Don't delay. Start taking that extra production now. Prompt deliveries can be made.

CULLMAN
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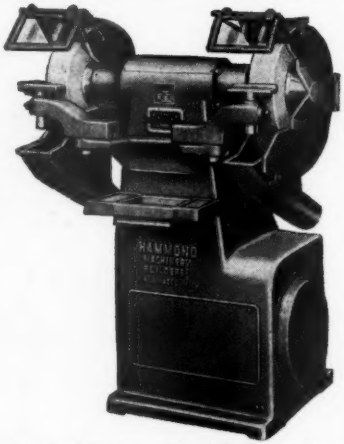
Hammond Announces Three New Magnesium Grinders

The "RW" series of grinders for magnesium grinding is announced by Hammond Machinery Builders, Inc. Built in 10", 12" and 14" sizes, the "RW" series are equipped with heavy plate wheel guards which have direct exhaust outlets for connection to dust collecting systems. The new grinders are equipped with larger oversize spindles for smooth vibrationless operation and larger bearings are sealed against dust and grit. Multi-V-belt drive gives any desired spindle speed.

The functionally engineered design of the base pedestal allows the use of any standard motor, an advantage to shops and plants that have standardized on



motor equipment. The "RW" series are equipped with explosion proof electrical systems. Other grinders in the Hammond line can also be similarly equipped for magnesium grinding.

Complete equipment for the "RW" series includes, in addition to the above features, hinged wheel guards and spark deflectors, adjustable work rests, tool tray and removable water pot. Wheels and eyeshields, as illustrated, can be furnished.

For complete information on the "RW" series of Magnesium Grinders write Hammond Machinery Builders, Inc., 1631 Douglas Ave., Kalamazoo, Mich. 95-J

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SAVE TIME and CUT COSTS!

CERROMATRIX (Melting Temp. 250° F.) For securing punch and die parts, anchoring machine parts without expensive drive fits, short run forming dies and other metal-working applications.

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To manufacturers of military or essential civilian products, whose own facilities are inadequate or unsuitable for certain items of production, requiring precision machinery, this company offers a dependable source of supply. This is not an unlimited service, of course, but our equipment of turret lathes, 3¾" automatics, millers, grinders, etc., is new and highly efficient, insuring fast and accurate production. *We may be in position to book your order immediately. Why not inquire?*

MERZ *Engineering Company*
INDIANAPOLIS 7, INDIANA

(CONTINUED FROM PAGE 176)

able, predetermined rate with smooth, uniform torque and then the current is automatically adjusted to furnish the torque demanded by the load to maintain constant speed. Should the motor "stall" due to overloading, the electronic controls automatically limit the current drawn, providing full protection of all equipment. Upon restarting by the operator, the motor pulls up to the selected speed without further adjustment.

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Better COMPRESSED AIR After-Cooling

● Keeping moisture out of compressed air is the best way to prevent troubles and damage to pneumatic equipment. Water, condensing in the air lines, wears out and rusts out the vital parts of compressed air tools as well as freezing up air lines and delaying production. In many industrial uses excess moisture or oil in compressed air is also damaging to other materials or products.

The best way to halt such troubles is to use a NIAGARA Aero AFTER COOLER with your air compressor. By evaporative cooling, using atmospheric air as the cooling medium, it obtains lower temperatures and produces compressed air containing only ½ to ¾ as much moisture as air cooled by conventional methods. At the same time it saves cooling water costs, repays its installation cost quickly. It also provides compressor jacket water at controlled temperatures.

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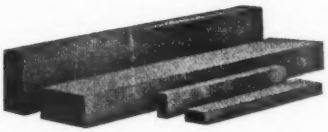
FLAT PARALLELS



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These Parallels are straight and true in all sizes. Sizes are specially selected for their convenience and general usefulness.

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3/8	1/2	6	3.00	11/16	1 1/4	12	7.25
3/8	5/8	6	3.00	3/4	1	12	7.00
3/8	3/4	6	3.50	3/4	1 1/4	12	7.50
3/8	1 1/2	6	3.50	13/16	1 1/2	12	7.75
7/16	7/8	6	3.50	1	1 1/2	12	8.00
1/2	3/4	6	3.50	1	1 1/2	12	8.50
1/2	7/8	6	4.00	1	2	12	9.50
1/2	3/4	6	4.00	1 1/4	1 1/4	12	8.00
1/2	1	6	4.00	1 1/2	1 1/2	12	9.50
1/2	1/4	9	5.00	1 1/2	2	12	10.50
1/2	3/4	9	5.00	1 1/2	2 1/2	12	12.00
1/2	1	9	5.00	1 1/2	2	12	12.00
3/4	1	9	6.00	1 1/2	3	12	15.00
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TOLERANCE .0001" To .0009" in 12"
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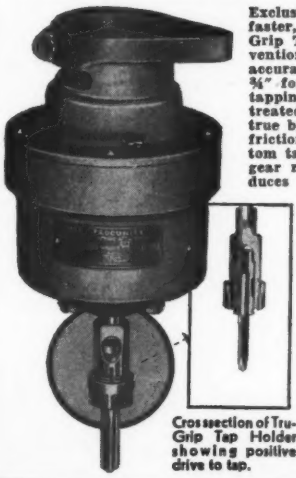

Cross section of Tru-Grip Tap Holder showing positive drive to tap.

Exclusive design features in Procunier Tapping Heads assure faster, more accurate tapping—with less tap breakage. The Tru-Grip Tap Holder, for instance, weighs *one-third* as much as conventional chucks, which kills fly wheel effect and promotes more accurate tapping. The tap holders have small outside diameter—¾" for No. 1, 1" for No. 2, 1⅛" for No. 3—which permits use of tapping head in hard-to-get-at spots. Shank is one piece, heat treated and precision ground. Tap is driven by square and held true by the round. Many other features include: Dry, double-cone friction clutch that won't wear and can't absorb oil; makes bottom tapping easy; ball bearings; three point balanced, heat-treated gear reversing mechanism, which distributes pull and greatly reduces strain.

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giving full details, description and prices on complete line of Procunier Precision Tapping Heads, the Tru-Grip Tap Holder—and Tapping Machines.

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Send me bulletin on: ☐ High Speed Tapping Heads ☐ Tru-Grip Tap Holders ☐ Universal Tapping Machines.

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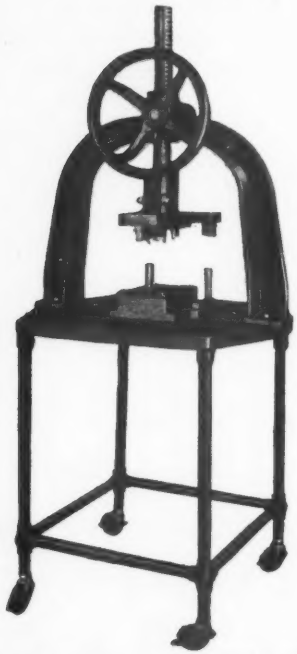
Faster **PUNCH-TO-DIE ALIGNMENT**



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You'll never need a pry-bar or hammer to separate punches from dies if you use this unique die-set machine. Positive, sensitive alignment is assured the die-maker, who can now complete the die-set right at his bench. Result: saving in toolroom time and improvement in the finished die.

Of sturdy, open construction, it can be operated with one hand under full manual and visual control. With the die-shoe clamped to the table and the punch-holder fixed in position in the ram, the punch can be removed as often as needed without disturbing alignment. Rugged for fitting up heavy die-sets, it is also useful for shearing in certain types of punches.

Ask today for full details.

Sole Distributors

MOORE SPECIAL TOOL CO., INC.
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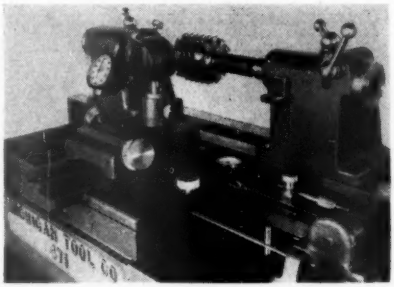
Michigan Tool's New Inspection Instrument

A new machine—the Michigan No. 471 Checker for Hobs and Milling Cutters—designed to completely check the correct resharpening of hobs or milling cutters, has been added to the "Sine-Line" gear and gear cutting tool checking equipment by Michigan Tool Co., 7171 E. McNichols Rd., Detroit 12, Mich. Hobs or milling cutters with a maximum OD of 10", length of 8", arbor or shaft length of 16", may be checked for spacing of flutes (either parallel or spiral gash), rake angle of flutes, parallelism of straight flutes, taper on the OD, and concentricity of proof diameters by means of two standard interchangeable indicator assemblies. Two additional interchangeable indicator assemblies are available for checking lead of hob or spacing of threads in multiple thread hobs, measured in a plane parallel to the axis of the hob; and for checking depth of tooth of tapping hob.



To simplify setting of indicators for such checking, a ground surface angle block, the top edge of which is in the same horizontal plane as the headstock and tailstock centers, and the projecting ledge in a parallel plane, is mounted on the tailstock and used for initial indicator settings. The projecting ledge is used with "Jo" blocks to set indicator for checking hooked or raked hobs. The indicator base is ball bearing mounted for freedom of movement, and in a plane parallel to the horizontal plane of the centers. Initial settings are accomplished by rolling the indicator ground surface opposite the block, and adjusting vertical setting of the indicator. 47-J

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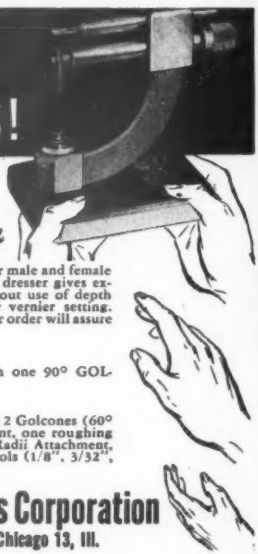

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The hands of your skilled workmen are not exposed to unnecessary accident risks when they use the Make-All Radius Dresser . . . its simple construction and easy operation are designed to keep operator's hands away from the revolving grinding wheel. A time-saver for male and female radius dressing . . . this dresser gives exceptional accuracy without use of depth gauges, micrometer or vernier setting. Priority rating with your order will assure prompt delivery.

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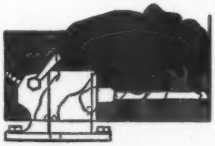

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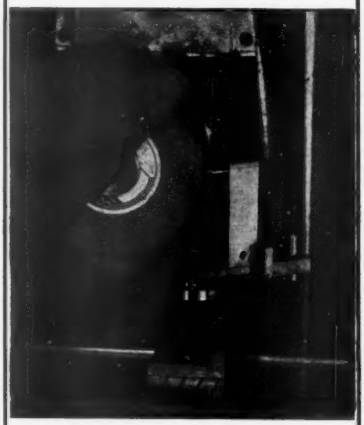

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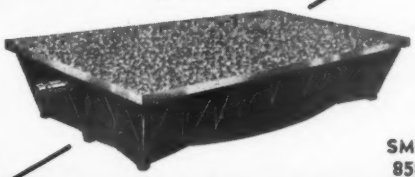

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Select a surface grinder fitted to your job! Small tool and die grinding operations can be done just as accurately and at less cost on Builders hand operated 'T' Grinders, releasing large automatic grinding machines for long run jobs. Handy and inexpensive, the Builders 'T' Grinder is quick and easy to use . . . with large vertical capacity—10" from top of table to face of grinding wheel.

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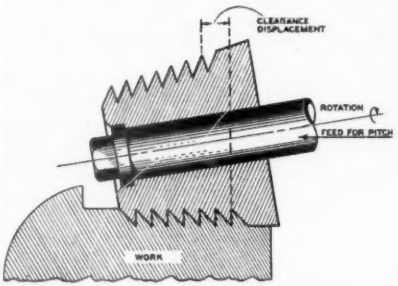
High Production Milling of Straight Side Threads

A special taper type thread milling cutter that produces straight sided threads at production speeds has been developed by Detroit Tap & Tool Co. This new idea in cutter design makes possible faster and more uniform high quality thread milling of straight sided threads than possible with other production methods.

The cutter was originally developed to cut buttress—or straight sided threads—in an aluminum forging into which valve seat inserts are screwed. Maximum strength in one direction is an advantage of straight sided threads. In this case the increased thread strength was needed in opposition to the thrust exerted by the screwed-in valve seat insert. The problem was to produce such threads at high production rates. These tools are now in use in several plants.



Section of Detroit Taper Type Thread Milling Cutter producing straight side thread. Note that inclination of the cutter axis provides for clearance displacement.

Originally, the threads in the aluminum forging were of National Form. Since it was considered more desirable to go to straight sided threads to provide the additional uni-directional thread strength to prevent breakage, the change was made. Grinding was not considered suitable for these threads. Conventional straight sided thread milling cutters failed to give complete satisfaction, tending to produce a tearing action on the

(TO PAGE 194—PLEASE)

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THE MEDIUM – **Brightboy**

Rubber gives RESILIENCY—relative softness that controls and "cushions." Rubber-cushioned BRIGHTBOY applies this resiliency—combines rubber and abrasive—for close tolerance

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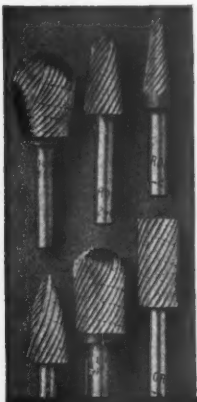

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GROUND FROM THE SOLID

There is a GROBET ROTARY FILE in shape, size and coarseness of cut for every type of hard or soft metal, plastic, wood etc. GROBET FILES do their jobs better and stay sharp longer.

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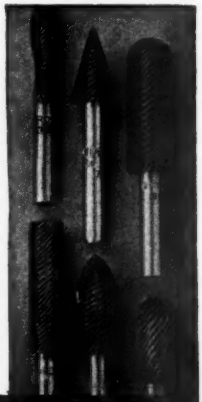

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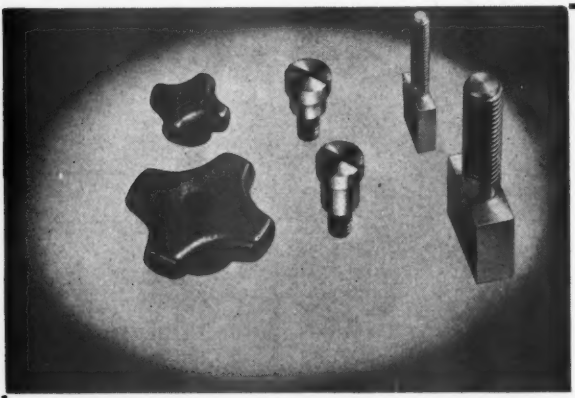
IMPORTERS OF GROBET SWISS FILES — MFRS. OF GROBET ROTARY FILES



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This set consists of one Type B-2 holder, 9 cutters ranging from 3/8" to 1 1/8", 9 pilots from 1/4" to 7/8" and 2 countersinks 7/8" dia.—70° and 82°.

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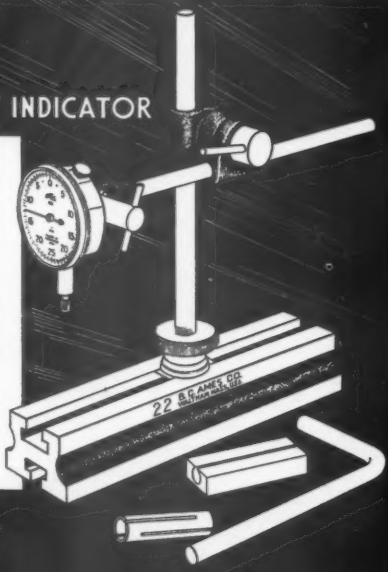

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A New Standard of Accuracy

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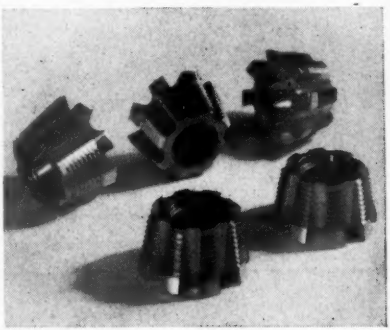
(CONTINUED FROM PAGE 190)

straight side of the tooth, especially at the crest. Further, it was not possible to provide for necessary clearance for the straight side of the form relieved cutter teeth. Finally, tapping proved too slow and expensive as a method for producing such threads.

A field engineer of the Detroit Tap & Tool Co. analyzed the problem and worked out the cutter and cutting action as illustrated. Cutter teeth engage the work parallel to the axis of the threads being formed while rotating in a plane



Typical Taper Type Thread Milling Cutters for milling buttress or straight side threads in aircraft parts.

inclined to the straight side of the thread. The inclination of the cutter at an angle equal to the taper of the cutter provides clearance for the straight side cutting face. The inclination of the cutter axis of rotation results in each point of a cutting tooth revolving in a plane equally inclined, at point of contact, to the vertical face of the straight-sided tooth form. The result is that the cutting load is evenly distributed over the full length of the tooth face eliminating any tearing action. A plain milling section of the cutter removes the incomplete thread at the outer edge.

Detroit Tap & Tool Co., 8432 Butler Ave., Detroit, Michigan, will send descriptive literature at your request. 134-J

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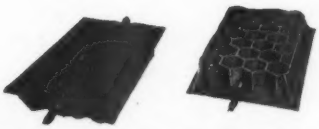

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Here's one way to get built-in, positive precision in surface plates — make sure to use Meehanite Metal Surface Plates with the special weight-distributing Honeycomb Base. The extra 33 per cent weight advantage which these surface plates have over other quality plates is distributed evenly over the entire surface. They are hand-scraped to extremely close tolerances.

They are available in 22 standard sizes ranging from 3½ x 4 to 48 x 96. They weigh from 5 lbs. to 6000 lbs., are from 2½" to 12" in height, while tolerance ranges from .0001" to .0005". Other sizes to specification. Angle plates and straight edges of Meehanite Metal also available. Good deliveries on most sizes. Write for folder. Prices on request.

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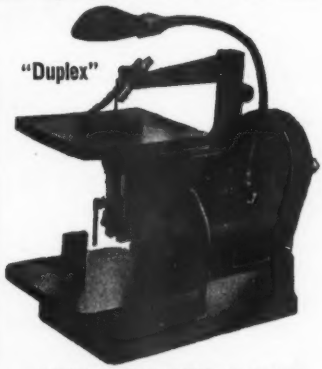

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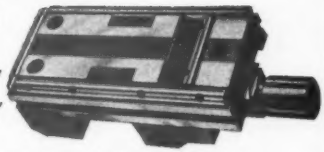
No. 3 TILTS THREE WAYS Sine of 6" & 3" Size 7½"x3½"x2¾" Opens 3½"



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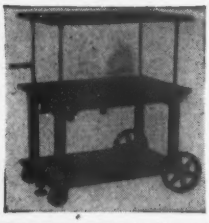

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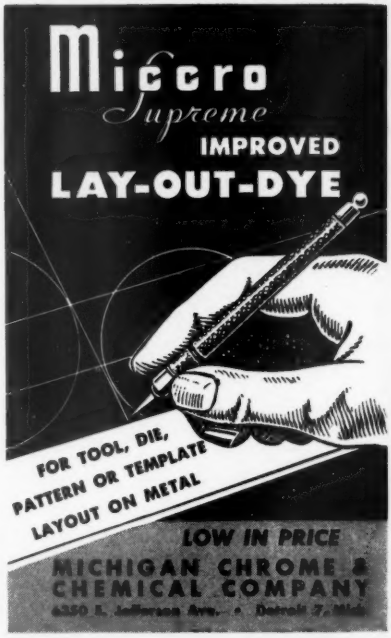

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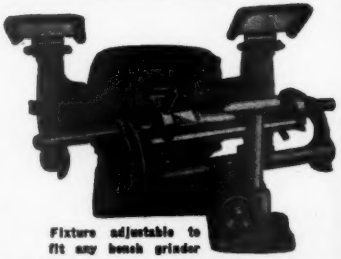
With HOLDING Fixture for Bench Grinder

This inexpensive equipment quickly saves its cost. You can regrind old, worn taps repeatedly and make them cut like new again. Grinds any desired chamfer and relief uniformly on all flutes of plug or taper taps, right or left hand. Send for circular.



Fixture adjustable to fit any bench grinder

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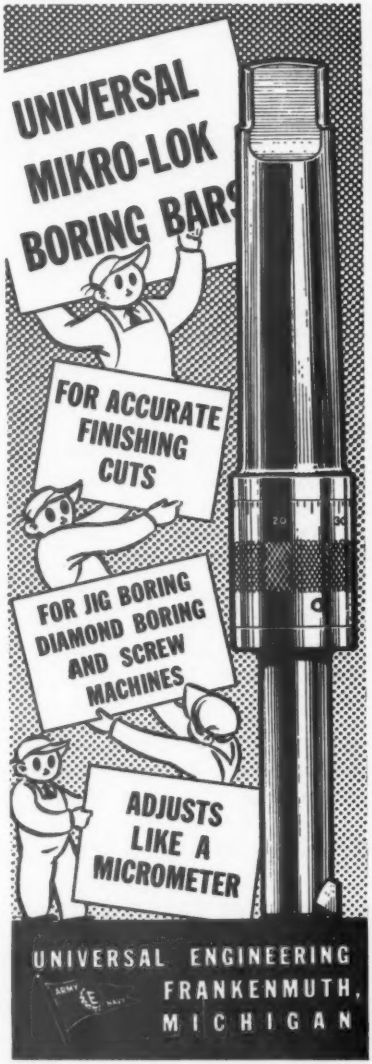

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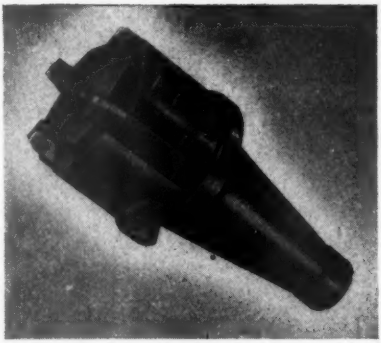

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Kennamills permit high speed carbide milling of steel with the same smoothness of operation attained with multiple blade cutters, yet they are as simple to maintain as fly cutters. Tool and cutter grinders are not necessary, since the blades may be removed fro mthe cutter head and resharpened to a template on a simple, adjustable table, carbide grinder. Similar designs of cutters with one or two Kennametal-tipped blades were improvised during the past four years for fly-cutting of steel. In numerous shops they have permitted rapid, high quality work even by inexperienced operators. The new Kennamills are a distinct advancement in fly-cutter milling technique, since on cuts of over ¼" depth the horsepower available on modern milling machines can be fully utilized. Work is distributed among the greater number of blades, and load on the machine thereby smoothed out.

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The new 76-page "Blue Book for Management, Shop and Production Engineers" just issued by the Delta Mfg. Co., Milwaukee, Wis., is a veritable "Family Album" of Delta drill press head and column case histories; a total of 140 applications and adaptations in special-purpose machines being pictured and described.

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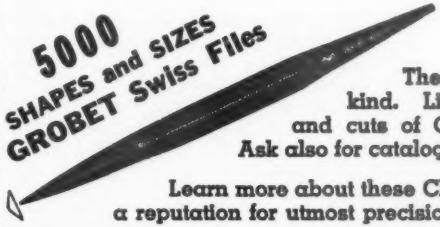

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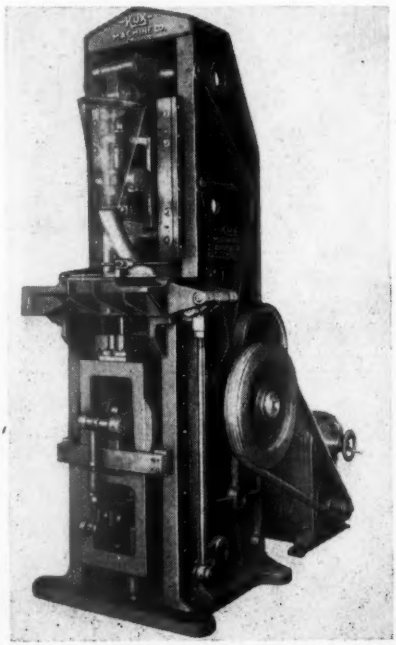
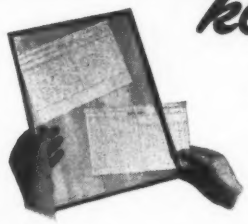


keep it Clean!



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A MIDGET IN SIZE

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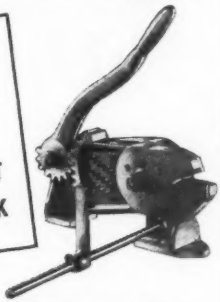

Cuts wire, rods or band iron easily and quickly. Any size wire or rod up to 5/8 inch round or 3/8 inch square and band iron up to 1/8 by 2 inches. Its small size and low price makes it possible to have more than one, mounted wherever convenient. Gage can be set for repeated cuts of same length on both wire or band iron.

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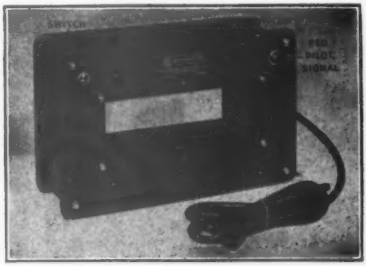
A Tool Room Necessity



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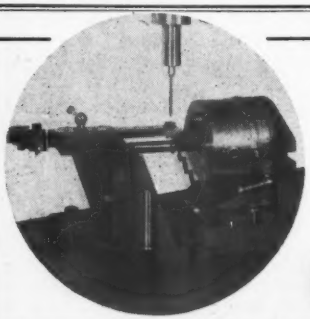

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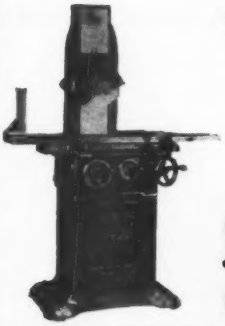

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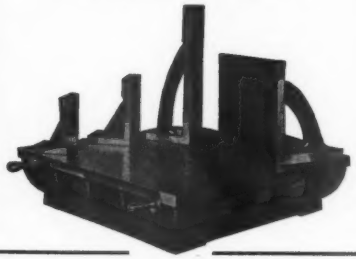

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Sensitive . . .
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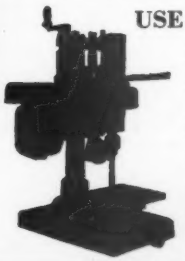

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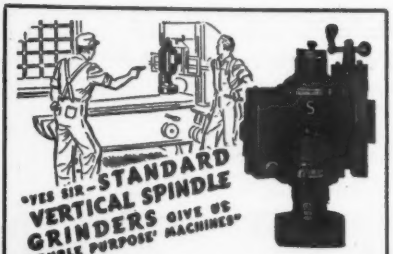

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For use on Lathe, Shaper, Planer, Boring Mill, etc. A 2-in-1 Tool—You can grind externally, and in a few minutes mount an interchangeable Quill for internal grinding up to 24" deep. Write for Catalog 43.

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EASY MOUNTING
Large Quill
4" Travel
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The new Sheffield torsiometer, a direct reading comparator for precision measuring of torsion of small spiral springs, has been developed by collaboration of the Sheffield Corporation, Dayton, Ohio, with the Gruen Watch Company and the Manross Division of Associated Spring Corporation. Readings are made in millimeter grams on a graduated, Manross scale. The torsiometer will accommodate springs up to 2⅞" in diameter with a maximum torsion measurement of 49.5 mm grams—sufficient capacity to cover practically all springs used in most instruments.

Authorities report that this instrument will save 5 to 10% of labor assembly costs, the exact amount depending on the type of instrument. The tedious process of trial assembling, disassembling, cutting, fitting, etc., can be avoided since the precise torsion of the spring will be known when it is assembled. This will assure the higher uniform accuracy of the instrument's performance.

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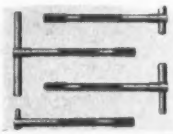
are precision ground—all parts subject to wear are hardened—ground to proper radius.



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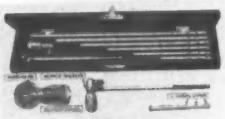
Highest accuracy—finest workmanship. Ask any man who owns one.



Made in 2 sets:

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Also M & L Precision Tapper—Sine Plates and Bars—Universal Angle Plates

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Replace your worn or broken
FLEXIBLE SHAFTING
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Built with 40 years of "know how" ELLIOTT Flexible Shafting will give rugged performance for a long time at low cost.

Quickly and easily repair your worn or broken flexible shafts in your own shop with ELLIOTT Flexible Shafting. They cut clean and make repairs simple without unraveling or flying apart . . . send for a sample and see for yourself. ELLIOTT cores rotate free and easy and the unusual flexibility gives high efficiency at high speed even at minimum radius.

ELLIOTT Flexible Shafting is sold in 25 to 28 ft. mill lengths and is easily fitted to all sizes and styles of equipment.

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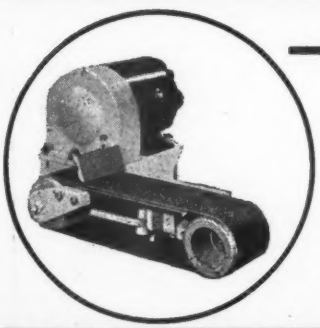

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This new, streamlined bench type grinder assures fast, quality finishing on metals, plastics, wood, fibre . . . at low cost. Built to machine tool specifications, Standard D-4 is equipped with improved band tension control and specially designed protective motor hood. 4x36¼" band. The ideal portable unit!

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IT'S Everlasting-
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PENCIL
$10
IMMEDIATE DELIVERY

For marking glass, crystal, cemented carbides, plastics, etc. Now you're sure of a scriber with an everlasting point. Constructed with top-grade strongest point diamonds.

Priority required.

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For MARKING *Tough* METALS

HEAVY DUTY
ALLOY STEEL TYPE

HAND HOLDER—This popular Heavy Duty Holder is easy to grip. Available from stock. Allen head set screw holds type rigidly and affords quicker changing of characters.

PURPOSE—For stamping parts requiring stronger type than Standard. Heavy Duty Type of alloy steel, when used with above Hand Holder, not only gives longer service but also top quality marking.

TYPE CONSTRUCTION—Heavy Duty Type has a heavier bevel, larger body, is engraved deeper, and all the potential fracture points have been eliminated.

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New Patents of Tooling Interest

(for obtaining, see page 128)

FLAW DETECTING APPARATUS, No. 2,333,086.
GRINDING APPARATUS, No. 2,333,101.
VISE, No. 2,333,114.
ASSEMBLING TOOL, No. 2,333,120.
PRESSURE MOLD & PROCESS OF MOLDING, No. 2,333,131.
LUBRICATING APPARATUS FOR BROACHING MACHINES, No. 2,333,147.
LATHE TOOL, No. 2,333,156.
AUTOMATIC DIE, No. 2,333,163.
FILING MACHINE, No. 2,333,169.
POWER OPERATED CHUCK, No. 2,333,180.
PROTECTION OF FERROUS METALS AGAINST CORROSION, No. 2,333,206.
METHOD OF MAKING BEARINGS, No. 2,333,227.

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CONVERTED INTO SPECIALS
RADIUS GROUND—ANGLES APPLIED
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PROMPT SERVICE—ONE PIECE OR HUNDRED
USED MILLING CUTTERS, END MILLS, TAPS
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The Heimann Transfer Screw Set is a self-contained, complete tool. No wrenches or pliers are necessary. Made in ¼" to 1" diameters.

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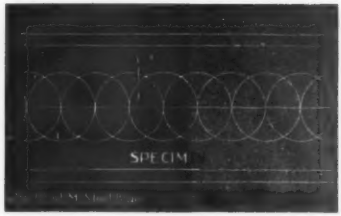

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Simply brush on, ready for the layout in a few minutes. The dark blue background makes the layout lines show up in a sharp relief, and at the same time prevents metal glare. Increases efficiency and accuracy.

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Offered in two sizes.

Vise No.	Width of Jaw, Inches	Opens Inches	Weight Pounds
1D	3½	3½	12½
2D	6	5½	23

Do you need a vise of ANY type?

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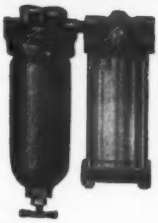

Removes 96% to 97% of All Water, Dirt and Scale from Airline.

AIR passes through a series of brass discs with .002 spacings, providing the finest degree of filtration obtainable. Then as the air passes through head of Lubricator, oil is delivered into the purified airline in any desired volume. The scarcity of replacement parts makes the use of these devices doubly important.

A combination of this kind is only as efficient as the filter unit of the assembly.

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Simple in Operation - Positive in Action - Easy to Install

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CAPACITY:
3/16" to 2½" drills.
5" x 9" adjustable table.

MOTOR: ½ hp, 3450 rpm.

NET WT: 250 lbs.

CRATED: 320 lbs.

PRICE: $150.00.

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Student Workers

The policy regarding the employment of part-time students presented several months ago by the War Manpower Commission, the U. S. Office of Education and the Children's Bureau of the Department of Labor has been approved by the War and Navy Departments, the Maritime Commission and the War Production Board. The plan endorsed recommends a combined work and school week of not more than 48 hours and a combined work and school day of not more than nine hours for 16 and 17 year olds. All agencies concerned urge upon manufacturers the observance of such standards as a means of making a more efficient use of their student workers without serious loss to the young people's schooling.

Commenting on the action of the four agencies, Donald M. Nelson, Chairman of the War Production Board, said that acceptance of these policies on part-time employment of high-school boys and girls "would get more war goods produced," and he called upon management and labor to support the recommendations.

Part-time student workers number roughly 2,000,000 youths of 16 and 17 years, and in many cases, where too heavy a combined load is carried, their services are not used efficiently, adding to the labor turnover, and they do not keep up with their school work.

The policy stresses employer's adherence to the child-labor provisions of the Fair Labor Standards Act and observance of state child-labor laws.

6 DAYS DELIVERY
ON
THREAD MILLING CUTTERS, CLASS 1: 2 OR 3 FIT.
COMBINATION FORM CUTTERS
GROUND THREAD CHASERS FOR THREADING MACHINES
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and
DIES AS PER CUSTOMER'S SPECIFICATIONS
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U. S. MACHINE TOOL MFG. CORPORATION
CLINTON, INDIANA PHONE 85

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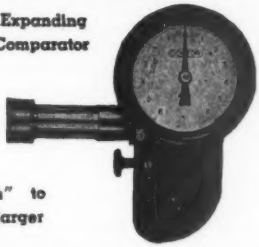
Patented Expanding Internal Comparator



Sizes: ¼" to 7" and larger

Comtorplug puts into the hands of your operators, inspectors, trainees, a practical means of gaging holes to fractions of .0001". Accurately indicates size, out-of-round, front or back tapers, etc. Completely dependable, even in comparatively inexperienced hands.

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Vastly improved new models.

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NEW CALIPER
SPEEDS UP DEFENSE WORK

Direct Reading Accurate, Fast, Simple. New timesaving tool SAVES TIME, SPEEDS UP PRODUCTION. Graduated scale, easily read at a glance. Adaptable to all types, shapes of work, wood or metal. Measures 0 to 4 inch.

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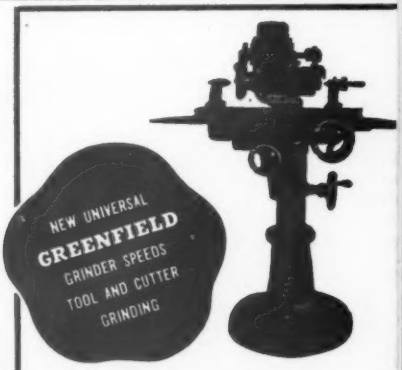

The rugged GREENFIELD No. 4 Tool & Cutter Grinder is serving industry as an invaluable production and toolroom machine. The spindle design of the new and improved GREENFIELD Wheel Head incorporates generous bearing areas—scraped to fit and thoroughly run in. Quickly and easily set up attachments provide toolroom versatility for grinding formed cutters, taper and rose reamers, flat surfaces and compound angles. Send for detailed and illustrated job application bulletin.

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20" long x 12" wide x 6½" deep.
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Send for priced circular.
Priority Regulations Govern Delivery

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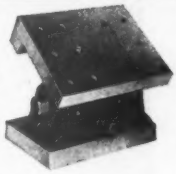
McMahon Adjustable Angle Plates



Model "A" Adjustable Angle Plate with four ⅜" "T" Slots. Size, 3" 3x" x 3¼". *Price*, $14.40. Shipping weight, 5 lbs.
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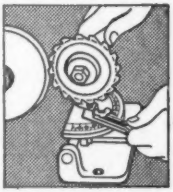

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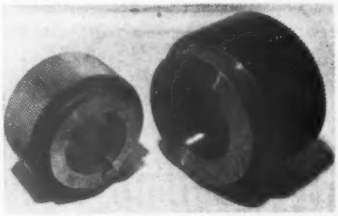

TOOLTHRIFT COMPANY
1245 Washington Blvd. • Pittsburgh

Would you like to know more about the new, war-born TRICO MICRO-CHEK now speeding up the gaging of millions of precision parts in over 3300 war plants? How inexperienced girls quickly become dependable inspectors? Send for our booklet which shows many applications of this accurate, speedier comparator gage.

TRICO MICRO-CHEK
TRICO PRODUCTS CORP.
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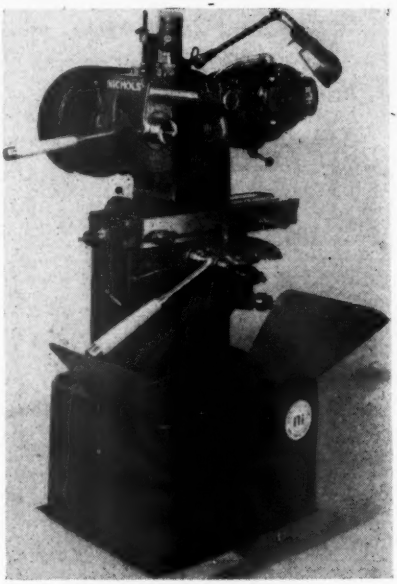
New Nichols Milling Machine Features

A new model of the Nichols Milling Machine, incorporating a number of improvements stimulated by extensive tool room and war production shop experience, is announced by W. H. Nichols and Sons through their distributors, Nichols-Morris Corporation, 50 Church St., New York, N. Y. General specifications and high-precision construction remain essentially as before; all tooling and attachments are interchangeable between new and old models.



A new streamlined column of rugged proportions provides ample support for knee and saddle, sliding spindle head, driving equipment and controls. A bracket within easy reach of the operator embodies electrical push-button controls, and an adjustable depth stop for rise-and-fall spindle head, and an adjustable machine light. A drum switch for pre-selection of spindle rotation is mounted conveniently on the back of the column. The rise-and-fall spindle housing slides on long hand-scraped ways and provides valuable flexibility in that

(TO PAGE 216—PLEASE)

BOYAR-SCHULTZ
No. 1 PROFILE GRINDER

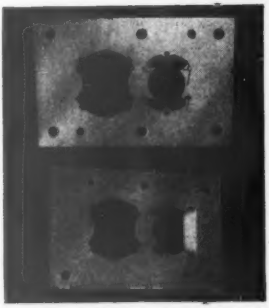
New Improved Design . . .

New Improved Table

You Can Do It BETTER . . . FASTER With Boyar-Schultz No. 1 Profile Grinder

1. In Tool and Die Work. Replaces slow hand work in fitting dies and punches.
2. Speeds grinding and finishing profiles and contours in Production.
3. High spindle speed assures efficient grinding even with ⅛" diameter wheels.
4. New Design — Streamlined for appearance and rugged durability.
5. New Square Table has serrated top which frees surface of grindings, and permits smoother movement of work and closer tolerances.
6. Light in weight and portable.

Write for New Circular giving Full Description



For Die Repairs Also—*Upper photo shows a die broken in service. Lower photo shows how die was prepared for insert with No. 1 Profile Grinder.*

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IMMEDIATE DELIVERY
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PROMPT DELIVERY ON SPECIAL TOOLS, DIES, JIGS AND FIXTURES MADE TO YOUR EXACTING REQUIREMENTS

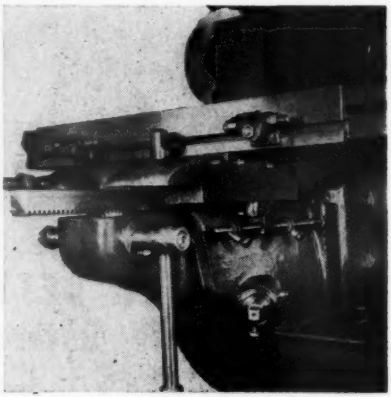
Write for prices on standard sizes or submit blueprints for quotations on special sizes.

Galter Manufacturing Co.
711 W. Lake Street · Chicago, Ill.

(CONTINUED FROM PAGE 214)

the cutter can be fed to the work or vice-versa, whichever is more convenient. The spindle can be securely locked at any stage of the travel by a hand-lever. The front face of this housing is hand-scraped to provide for accurate mounting of cam-followers, dial indicators, or other tooling.

The table is thicker but not heavier in construction and scientifically ribbed to withstand excessive clamping pressures which might cause deflection. The table is available with work-surface lengths of 21" or 30", and table tops are ground to a mirror finish to insure accurate



alignment of milling fixtures. Standard ⅝" T-slot, deep oil pockets, and non-clogging oil outlet are provided.

The knee of the new model is designed so that a lever, rack and pinion transverse feed can be substituted for the regular transverse feed screw. This unique adaption gives the table and saddle the same flexibility of movement found in the conventional lathe carriage and cross slide and work can be chucked lathe-fashion on the spindle with tools mounted on the table. This feature of rapid transverse motion, combined with high spindle speeds and carbide-tipped tools, makes it possible to use the Nichols Miller for precision boring, facing, recessing, turning, counterboring and profiling—operations usually assigned to boring machines, profilers, or toolmaker's lathes.

Nichols-Morris Corp., 50 Church St., New York, N. Y., will send literature. 943-J

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OR
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Made in 4 sizes: ¾"—1½"—2½"—4".

When planning your postwar products, remember that a number of Hovis Master Washer Dies have been in continuous use for more than 4 years, and the Master Dies themselves do not become obsolete. A new set of interchangeable parts is all that you need for your new products.

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Announcing—

THE NEW SUPER STANDARD

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SHELL END MILLS AND FACE MILLS!

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● **If you are a production executive whose responsibility includes the hardness testing of metals, you will certainly want one of these new charts for your office, shop, or laboratory. Handsome in appearance, printed in three colors, with the very minimum of advertising, it will prove its value every hour of every day. Type is large, easily read at a distance of several feet, yet the chart itself is only 24" wide and 32" high — about the size of a calendar.**

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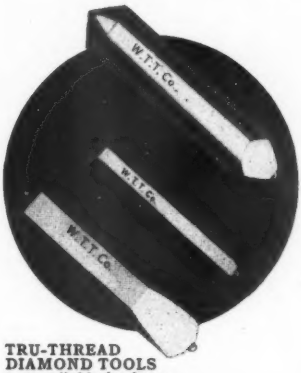

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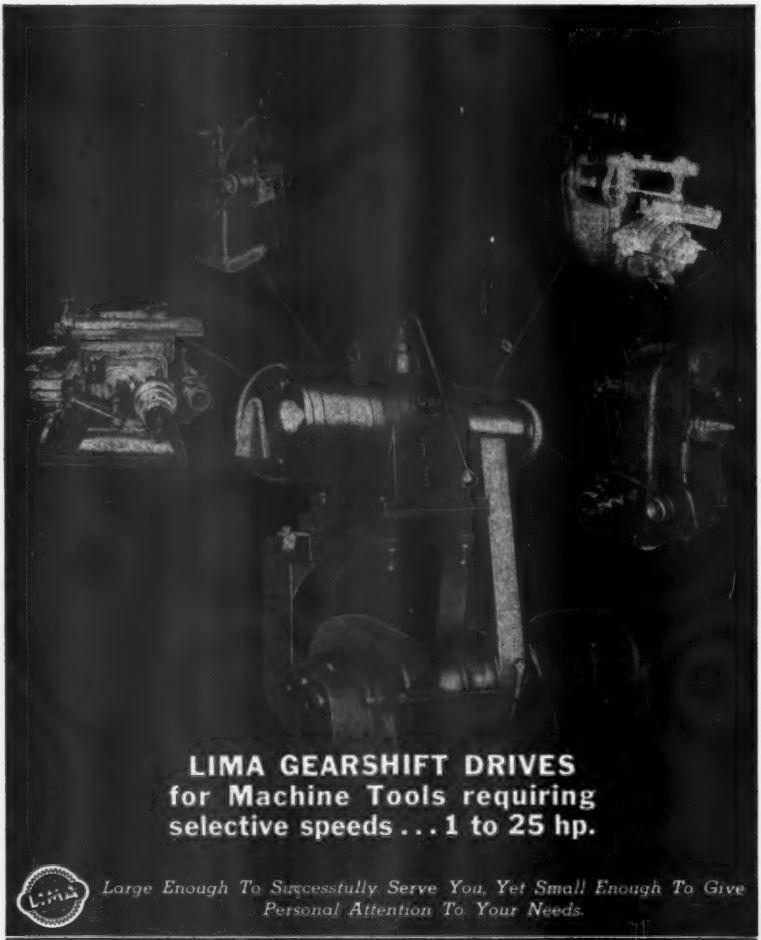

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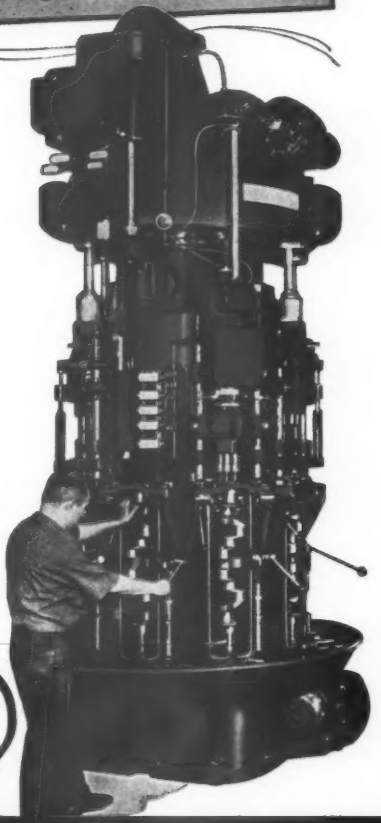

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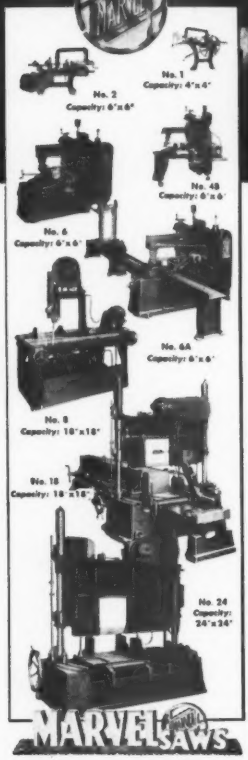

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The Ajax Steel & Forge Company, Detroit, has solved its cutting-off problems with a battery of MARVEL Saws. Before, billets were cut-off with a hammer—an operation which not only required at least four men and tied up hammers and furnaces, but also resulted in the waste of a great deal of forging steel.

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